2011 Regional Water Plan

Prepared by:
Region H Water Planning Group

With assistance from:
AECOM USA Group, Inc.
TBPE Reg. No. F-3082

Kellogg Brown & Root Services, Inc.
TBPE Reg. No. F-8649

Leggette Brashears & Graham, Inc. DBA LBG-Guyton Associates
TBPE Reg. No. F-4432
TBPG Reg. No. 50111

Ekistics Corporation

STATE OF TEXAS
JASON D. AFINOWICZ
100102
LICENSED
PROFESSIONAL ENGINEER

8-23-10
Jason D. Afinowicz, PE
Project Manager, AECOM USA Group

STATE OF TEXAS
KARIM T. EL KHEIASHY
103338
LICENSED
PROFESSIONAL ENGINEER

8-23-10
Karim El Kheiashy, PE
Project Manager, Kellogg Brown & Root

STATE OF TEXAS
WILLIAM J. SEIFERT, JR.
49984
LICENSED
PROFESSIONAL ENGINEER

William J. Seifert Jr.
8/23/10
W. John Seifert, Jr., PE
Principal, LBG Guyton Associates

STATE OF TEXAS
CHRISTOPHER DRABEK
GEOLOGY
4564
LICENSED
PROFESSIONAL GEOSCIENTIST

8/23/10
Christopher Drabek, PG
Hydrogeologist II, LBG Guyton Associates

Glenda Callaway
Glenda Callaway
Principal, Ekistics Corporation

August 2010
AECOM Project No. 60095519

Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviations used in the Report

Ac-ft/yr	Acre-feet per year
BRA	Brazos River Authority
CBWC	Chocolate Bayou Water Company
CHCRWA	Central Harris County Regional Water Authority
CLCND	Chambers-Liberty Counties Navigation District
COH	City of Houston
FBSD	Fort Bend Subsidence District
GBEP	Galveston Bay Estuary Program
GBF	Galveston Bay Foundation
GBFIG	Galveston Bay Freshwater Inflows Group
GCD	Groundwater Conservation District
GCWA	Gulf Coast Water Authority
HGCSD	Harris Galveston Coastal Subsidence District
MGD	Million gallons per day
MUD	Municipal Utility District
MWP	Major Water Provider (2001 Regional Plan Designation)
NFBWA	North Fort Bend Water Authority
NHCRWA	North Harris County Regional Water Authority
RWPG	Regional Water Planning Group
RHWPG	Region H Water Planning Group
SJRA	San Jacinto River Authority
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TWDB	Texas Water Development Board
WUG	Water User Group
WWP	Wholesale Water Provider
WHCRWA	West Harris County Regional Water Authority

Water Measurements

Acre-foot (AF) = 43,560 cubic feet = 325,851 gallons
Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day
Gallons per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr
Million gallons per day (mgd) = 1,000,000 gallons per day = 1120 ac-ft/yr

County Codes used in the Tables

8	Austin County
20	Brazoria County
36	Chambers County
79	Fort Bend County
84	Galveston County
101	Harris County
145	Leon County
146	Liberty County
157	Madison County
170	Montgomery County
187	Polk County
204	San Jacinto County
228	Trinity County
236	Walker County
237	Waller County

Basin Codes used in the Tables

6	Neches River Basin
7	Neches-Trinity Coastal Basin
8	Trinity River Basin
9	Trinity-San Jacinto Coastal Basin
10	San Jacinto River Basin
11	San Jacinto-Brazos Coastal Basin
12	Brazos River Basin
13	Brazos-Colorado Coastal Basin

Contents

List of Tables

List of Figures

ES - Executive Summary

ES.1 Introduction

In 1997 the State Legislature, through Senate Bill 1, determined that the Texas State Water Plan for the 2000 - 2050 time frame would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001 a new set of rules and guidelines from the TWDB were enacted through Senate Bill 2. With the help of the Senate Bill 2, the 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional Water Plans (RWPs) and State Water Plans (SWPs) produced every five years. The 2006 Region H Water Plan and the 2007 State Water Plan were created during the last planning cycle.

Region H encompasses all or part of fifteen counties in southeast Texas and includes the majority of the San Jacinto River basin and the lower reaches of the Brazos and Trinity River basins. A Location Map showing the regional boundaries is included at *Figure ES-3*. The Region H Water Planning Group (RHWPG) consists of 24 voting and 11 non-voting members that represent a diverse range of backgrounds and interests. Additional information about the RHWPG can be found in *Chapter 1* of the 2011 RWP or on the Region H Water website, http://www.regionhwater.org. Regional Water Planning is conducted under the oversight of the Texas Water Development Board. Information on Region H and the State Water Plan can be found at the Board website, http://www.twdb.state.tx.us.

Region H is an economic powerhouse crucial to the Texas and national economies. Adequate water supplies are essential to continued economic health and to the region's future growth. Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The area provides some of the state's most popular vacation spots that generate hundreds of millions of dollars in annual tourism revenues. The Port of Houston is the second busiest port in the nation. As of 2008, the Houston area employed 2.6 million people. Region H is generally characterized by urbanizing land uses and broad-based economic development. In areas outside of the urban core, agriculture dominates economic activities. Key contributors to each of six primary economic sectors are:

- Services - Medical (Texas Medical Center in Houston, University of Texas Medical Branch in Galveston), tourism, banking, construction and engineering.

- Manufacturing - Petroleum exploration, production and refining, petrochemicals, biotechnology, chemicals, computers and technology, and pulp and paper.

- Transportation - Port of Houston, rail and highway systems, Intracoastal Waterway, airlines, airports and air cargo facilities.

- Government - Federal, state and local including the Texas Department of Corrections, the Johnson Space Center, numerous law enforcement agencies, universities, colleges and school districts.

- Agriculture - Rice, soybeans, grain sorghum, peanuts, vegetables, hay, cattle, horses, swine, timber and pulp wood.

- Fishing - Commercial (oysters, shrimp, finfish) and recreational.

Any large-scale water supply or conveyance projects will require the close cooperation of political entities in the affected areas. While municipal and county governments are most visible in Region H, there are numerous other governmental and regulatory agencies with jurisdiction over aspects of water supply development in the region. These include, but are not limited to:

- State Agencies
    - Texas Water Development Board (TWDB)
    - Texas Commission on Environmental Quality (TCEQ)
    - Texas Department of Parks and Wildlife (TPWD)
- River and Water Authorities
    - Brazos River Authority
    - San Jacinto River Authority
    - Trinity River Authority
    - Lower Neches Valley Authority
    - Coastal Water Authority
    - North Harris County Regional Water Authority
    - West Harris County Regional Water Authority
    - Central Harris County Regional Water Authority
    - North Fort Bend Water Authority
    - Gulf Coast Water Authority
    - Baytown Area Water Authority
    - Brazosport Water Authority
    - Clear Lake City Water Authority
    - North Channel Water Authority
- Subsidence and Groundwater Districts
    - Fort Bend Subsidence District
    - Harris-Galveston Subsidence District
    - Bluebonnet Groundwater Conservation District
    - Lone Star Groundwater Conservation District
    - Mid-East Texas Groundwater Conservation District
    - Brazoria County Groundwater Conservation District
- Councils of Governments

- Houston-Galveston Area Council of Governments
- Brazos Valley Council of Governments
- Deep East Texas Council of Governments

- Eleven soil and water conservation districts
- Numerous Utility Districts and Water Supply Corporations

Of particular note are the two subsidence districts, because the regulation of groundwater use to control land subsidence compels many municipalities to seek new surface water sources. The regional water authorities were formed to collectively address this surface water transition. The creation of public/private partnerships aligning the interests of the public with those of the manufacturing, agricultural, power generating and mining sectors will be essential in developing the water needed to support the population and economy of Region H.

For public review and comment, copies of the Initially Prepared Region H 2011 Regional Water Plan were made available at the County Clerks' offices in each of the 15 Region H counties and were available in one public library in each of the 15 counties. The Plan is comprised of ten chapters:

Chapter 1: Description of Region

Chapter 2: Presentation of Population and Water Demands

Chapter 3: Analysis of Current Water Supplies

Chapter 4: Identification, Evaluation and Selection of Water Management Strategies Based on Needs

Chapter 5: Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas

Chapter 6: Water Conservation and Drought Management Recommendations

Chapter 7: Long Term Protection of the State's Water Resources, Agricultural Resources and Natural Resources

Chapter 8: Ecologically Unique Stream Segments, Unique Reservoir Sites, And Legislative Recommendations

Chapter 9: Water Infrastructure Financing

Chapter 10: Public Participation and Adoption of the Plan

For an in-depth discussion of any of the topics addressed in this Executive Summary, the reader is referred to the full report document. The full list of addresses of the 30 report holders is shown in *Table ES-3.*

ES.2 Population and Water Demand

ES.2.1 Population Projections

Population in Region H is projected to grow from approximately 6.0 million in 2010 to approximately 11.3 million in 2060. The doubling of population over the fifty-year planning period represents an

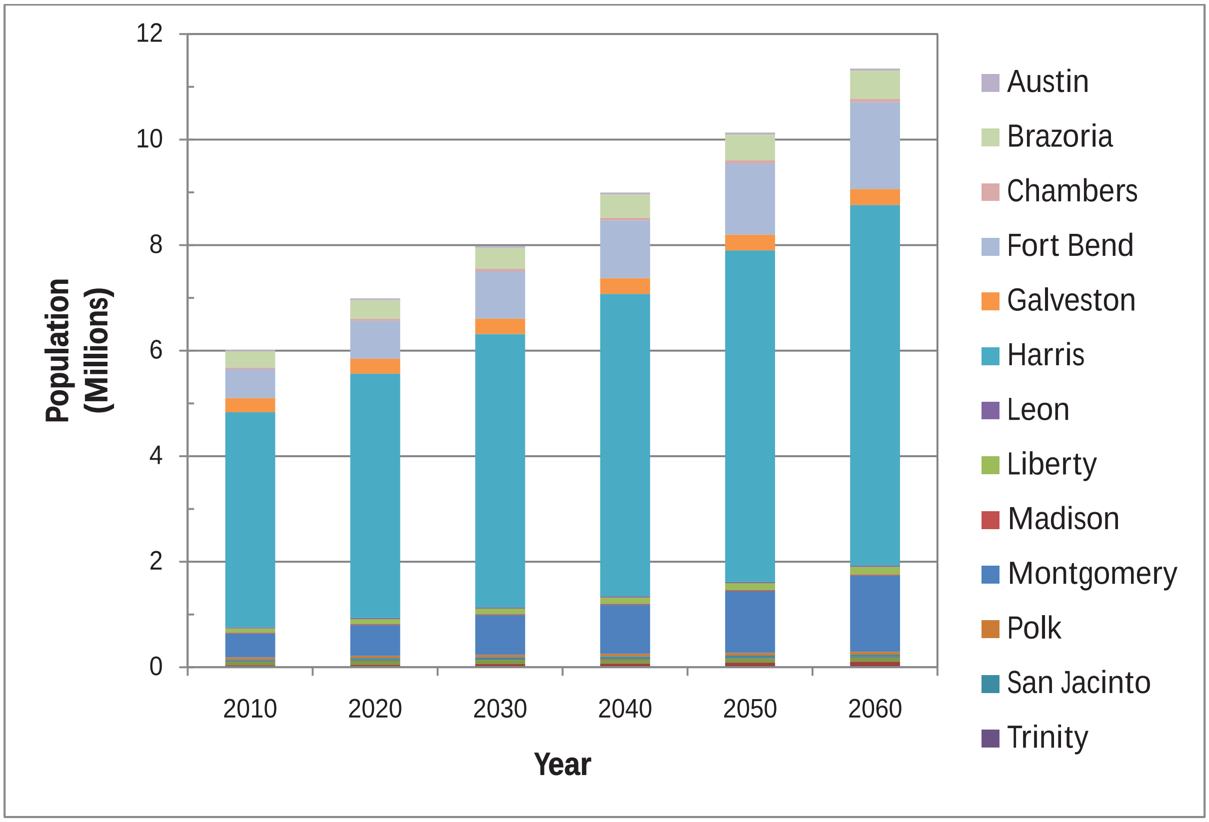
annual growth rate of slightly more than one percent. Population projections by county are shown in Table *ES-4*.
.
Population data are presented for each of the fifteen counties in the region, for cities of more than 500 persons, water districts providing 280 ac-ft/yr or more (0.25 mgd), and for collective reporting units (CRUs) consisting of grouped utilities having a common association. Within Region H, there are 257 municipal WUGs plus 15 county-other WUGs, further divided by basin and county. All smaller communities and rural areas, aggregated at the county level, are considered a WUG and are referred to as “County-Other” for each county.

The base county-level population projections were developed as part of the 2006 RWP using a standard cohort-component procedure in conjunction with data from the 2000 Census and other sources. This methodology was modified during the development of the 2011 RWP to account for growth in several counties that were not anticipated by the 2006 RWP projections. Increased population projections were developed for Brazoria, Chambers, Fort Bend, Harris, and Montgomery Counties based on information from the Texas State Data Center (SDC). These county populations were split into sub-county components known as Water User Groups (WUGs) based on data from the Year 2000 Census and SDC estimates. Additionally, two new water authorities, the Central Harris County Regional Water Authority and the North Fort Bend Water Authority, were added to the list of WUGs in the 2011 RWP along with three communities in Fort Bend and Montgomery Counties.

Figure ES-1, which was compiled using data generated as described above, shows that population growth in Brazoria, Fort Bend, Harris and Montgomery Counties represents approximately 89 percent of the Region H total population in year 2010 or approximately 5,387,370 persons. In year 2060, these same counties represent approximately 92 percent of the Region H total population or approximately 10,461,370 persons, as shown in *Figure ES-1*.

The approved projections are compiled in *Chapter 2: Population and Water Demand Projections*. The population projections serve as the basis for calculating municipal water demands.

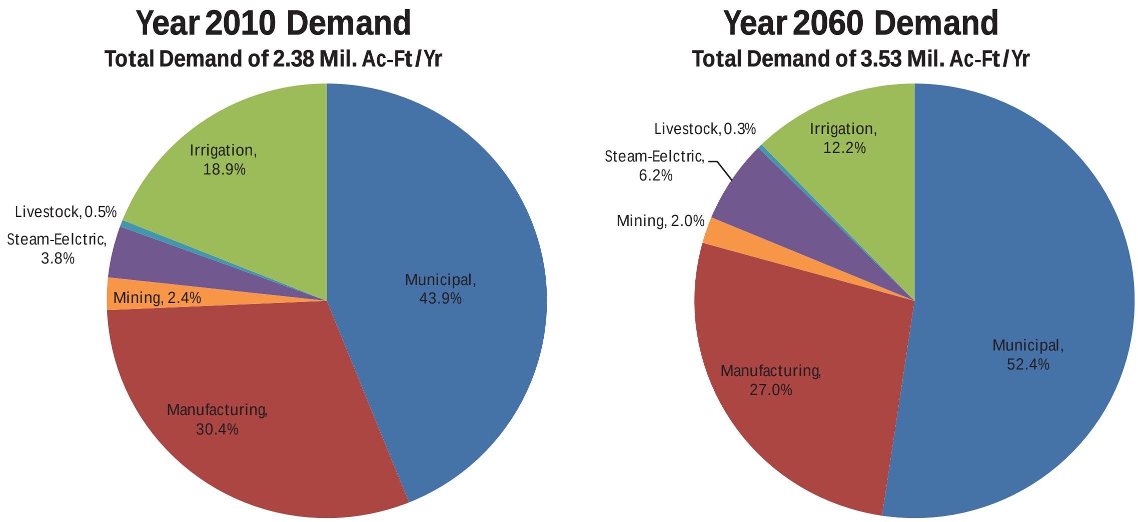
Figure ES-1
Region H Population Projections by County



ES.2.2 Water Demand Projections

Region H water demands are projected to increase from approximately 2.38 million acre-feet per year in year 2010 to over 3.52 million acre-feet per year by year 2060. In addition to municipal demand, water consumption for manufacturing, steam-electric power generation and mining will increase throughout the planning period. Water demands for livestock production are projected to remain constant within Region H. Irrigation is expected to decrease in Brazoria County and remain constant in the other counties, resulting in an overall reduction in irrigation water demand through the planning period. *Table ES-5* presents the projected water demands over the planning period, summarized by county and totaled for Region H. *Figure ES-2* shows that municipal water demands are projected to account for over half of the total regional water demands by 2060. Manufacturing demands, while still increasing, will account for a smaller percentage of total water use (declining from 30% today to 28% in 2060). The projected municipal water demands reflect existing water conservation programs and expected (passive) conservation from plumbing code changes, the latter reducing per capita demands approximately 8 percent by 2060. Additional water conservation for municipalities, manufacturing and irrigation is recommended as a management strategy. Region H accounts for 40 percent of Texas' manufacturing water use, the largest of the sixteen planning regions. Almost half of the total water demand in the Region is in Harris County.

Figure ES-2
Region H Water Demand Comparison



ES.3 Water Supplies

The total amount of water supply currently available to Region H from existing water sources is 3,556,538 acre-feet per year (ac-ft/yr) in 2010. Of that amount, about three-fourths is surface water. By the year 2030, the available supply will be 3,343,151 ac-ft per year. The reduction in supply between 2010 and 2030 reflects restrictions on the use of the Gulf Coast Aquifer, instituted to combat subsidence in a large part of the region. Groundwater supply is based on the projected sustainable yield of each aquifer and regulation on groundwater withdrawal, which limits extraction to the annual rate of recharge. Reduced reservoir yields due to sedimentation also contribute to the reduction in supply over time. The predominant sources of surface water supply are derived from three reservoirs: Lakes Conroe and Houston within the San Jacinto River basin and Lake Livingston within the lower Trinity River basin.

Surface water supply was determined using the TCEQ Water Availability Model, which analyzes permitted diversions against the historic rainfall record, which includes the drought of record period in the 1950's. In the Trinity and Brazos River Basins, limited wastewater return flows were included in the model, based on expectations that full reuse would not occur during the planning period. For all other basins, the yields are based upon the no-return-flow scenario used for water rights permitting. Some activities, such as livestock watering and mining, use riparian supplies and/or small impoundments that do not appear in the models. These supplies are considered “local sources” and are not projected to change in amount during the planning period.

A detailed analysis of water supply is found in the *Chapter 3: Analysis of Current Water Supplies*. A summary of available water supply by source is provided in *Table ES-6*.

ES.4 Water Needs and Management Strategies

ES.4.1 **Water Demand Versus Supplies**

Water supplies were compared to water demands to determine if any areas in the region are expected to experience water shortages during the planning period. Despite adequate overall water supplies for Region H through the year 2050, the RHWPG has identified communities that will experience water shortages during the planning period unless they take action to increase their supplies. Some of these communities will be able to meet their demands simply by extending or increasing existing water supply contracts.

The projected shortages identified in the year 2010 totaled 290,890 acre-feet per year, increasing to as much as 1,236,335 acre-feet per year in the year 2060. This year 2060 shortage is greater than the deficit of 1,069,469 identified in the 2006 RWP. This is discussed in further detail in *Chapter 4: Identification, Evaluation and Selection of Water Management Strategies Based on Needs*.

ES.4.2 Water Management Strategies

The RHWPG considered a variety of strategies for meeting the projected shortages and solicited input from the public before adopting a management plan. A detailed analysis process was developed to define potential water management strategies. The process addressed the specific shortages of all the WUG needs beyond existing supplies and then developed associated specific strategies assuming the WWPs would be the vehicle to solve WUG shortages. The process generally consisted of the following:

Water Conservation – For WUGs with projected shortages, an appropriate level of water conservation would be implemented, as discussed below.

Expanded Use of Groundwater – For WUGs in areas that benefit from adequate groundwater supplies to allow for future growth.

Contract Extension and Increase - For all WUGs currently served by a WWP, it was assumed that current contracts would be renewed throughout the planning period. Additionally, it was assumed that WUGs would increase their contracts with their current WWPs to meet projected growth, until current WWP supplies were fully allocated.

These general strategies were able to reduce the year 2010 shortages from 290,890 ac-ft/yr to 237,535 ac-ft/yr and the year 2060 shortage from 1,236,355 ac-ft/yr to 973,857 ac-ft/yr. After application of these general strategies, the remainder of the WUGs with shortages were grouped and addressed by county. Potential water management strategies were screened and considered to meet the needs of each county. The strategies considered included those in the 2006 Regional Water Plan, new water rights applications, wastewater reuse and seawater desalination. Management strategies that involved adjoining regions were coordinated with the appropriate water planning group.

The water management strategies selected to meet the projected growth in Region H are as follows:

Conservation Strategies

- **Industrial Conservation**—Industries with projected shortages will seek out ways to reduce their water demand as a means of managing their operating costs. The wide range of industries within Region H, and their varying progress in this area, prevented the estimation of projected savings for this strategy for general use. However, some information provided by manufacturing users in Fort Bend County was used to apply some level of conservation to the 2011 RWP.

- **Irrigation Conservation**—Reduction of on-farm demands through land leveling, canal lining and other system improvements. Projected water savings are 18,792 ac-ft/yr in Brazoria County, 24,018 a-ft/yr in Chamber County, 5,197 ac-ft/yr in Fort Bend County, 2,392 ac-ft/yr in Galveston County, 20,876 ac-ft/yr in San Jacinto County and 6,606 ac-ft/yr in Waller County.

- **Municipal Conservation**—Municipal conservation was applied at the WUG level based on projected savings provided by WUGs in their water conservation plans wherever possible. For other municipal WUGs, conservation was assumed to reduce demands at a level ranging from 5.55% to 6.34%, depending on the size of the WUG. Projected water savings total 75,696 ac-ft/yr in year 2030 and 105,494 ac-ft/yr in year 2060.

Contractual Strategies

- **WUG-Level Contracts** – Contracts to WUGs from WWPs were increased within the limits of existing supplies, including contracts to new customers. Additionally, some reallocation of existing supplies was performed where possible.

- **WWP Contracts** – Where possible, contracts will also be expanded between seller and buyer WWPs to enhance the use of existing supplies. Additionally, there are numerous cases where project sponsor WWPs will develop water supplies in order to provide water under contract to existing WWP customers before the water is sold to WUGs.

- **TRA to SJRA Contract** – Under this strategy, the SJRA will purchase approximately 76,500 ac-ft/yr of uncommitted supplies from the Trinity River Authority to serve Montgomery County.

- **TRA to Houston Contract** – Under this strategy, the City of Houston will purchase approximately 123,500 ac-ft/yr of uncommitted supplies from the Trinity River Authority.

Groundwater Strategies

- **Expanded Use of Groundwater** – Only a portion of the groundwater available to Region H is developed supply (i.e., existing wells). An additional 90,617 ac-ft/yr of new well capacity is needed to fully utilize this resource.

- **Interim Groundwater Use** – In some cases, the near-term needs in the year 2010 will be met with the use of additional groundwater supplies. This is only recommended where existing groundwater regulation permits.

- **New Groundwater Wells for Livestock** – Development of new groundwater resources for meeting minor shortages to livestock supplies.

Groundwater Reduction Plans

Incorporation of the many groundwater reduction plans that are planned and being carried out in Fort Bend, Galveston, Harris, and Montgomery Counties, including:

- **Central Harris County Regional Water Authority**
- **City of Houston**
- **City of Missouri City**
- **Fort Bend MUD 25**
- **Fort Bend WCID 2**
- **North Fort Bend Water Authority**
- **North Harris County Regional Water Authority**
- **Pecan Grove**
- **Richmond/Rosenberg**

- **River Plantation MUD**
- **San Jacinto River Authority WRAP**
- **Sugar Land**
- **West Harris County Regional Water Authority**

Reservoir Strategies

- **Allen's Creek Reservoir** – This proposed reservoir creates 99,650 ac-ft/yr of supplies for the City of Houston and the Brazos River Authority.
- **Brazoria County Off-Channel Reservoir** – This proposed reservoir creates 24,000 ac-ft/yr of firm supply for manufacturing demands in Brazoria County.
- **Dow Off-Channel Reservoir** – This proposed reservoir creates 21,800 ac-ft/yr in firm supply by increasing the storage associated with an existing Dow water right.
- **Fort Bend Off**-Channel Reservoir – This proposed reservoir creates 46,000 ac-ft/yr of firm supply for municipal and industrial demands in Fort Bend County
- **GCWA Off-Channel Reservoir** – This proposed reservoir creates 39,500 ac-ft/yr of firm supply for manufacturing use served by GCWA. This reservoir uses existing water rights with surplus interruptible supply to produce this firm yield.

Reuse Strategies

- **Fulshear Reuse** – Development of a direct reuse project for the City of Fulshear and surrounding utilities.
- **Houston Indirect Wastewater Reuse**—The City of Houston has applied for a water right permit to indirectly reuse up to 580,900 ac-ft/yr of wastewater discharges. A portion of that is recommended for direct reuse to industry.
- **Montgomery County MUD 8/9 Reuse** – Indirect reuse project for potable water by districts along Lake Conroe in Montgomery County.
- **NHCRWA Indirect Wastewater Reuse** –The North Harris County Regional Water Authority has the potential to indirectly reuse up to 126,000 ac-ft/yr of wastewater discharges.
- **Wastewater Reclamation for Industry** –This strategy proposes that 67,200 ac-ft/yr of Houston's municipal wastewater be treated and directly reused by industries along the Houston Ship Channel.
- **Wastewater Reclamation for Municipal Irrigation** – This strategy anticipates the development of direct reuse project incorporated into new community growth in the rapidly-developing counties of Region H.

Permit Strategies

- **Brazos River Authority System Operations** –The Brazos River Authority has applied for a water right that permits existing additional yield within their reservoirs, and new yield that can be achieved through operation of their reservoirs as a basin-wide system. Approximately 25,350 ac-ft/yr of this water will be available for customers in Region H.

- **Houston Bayous Permit** –The City of Houston has applied for an interruptible supply permit in the lower San Jacinto basin. The conjunctive use of this supply with existing supplies owned in the Trinity River Basin will reduce interbasin transfers in non-drought years.

Infrastructure Strategies

Inclusion of the many major infrastructure projects that will be implemented throughout the region in order to more effectively utilize existing water supplies or to allow the use of future water resources strategies, including:

- **Central Harris County Regional Water Authority Transmission and Distribution**
- **Chambers-Liberty Counties Navigation District West Chambers County System**
- **City of Houston Distribution Infrastructure Expansion**
- **City of Houston Treatment Infrastructure Expansion**
- **Harris County MUD 50 Surface Water Treatment Plant**
- **Luce Bayou Transfer**
- **LLWSSSC Surface Water Project**
- **North Fort Bend Water Authority Transmission and Distribution**
- **North Harris County Regional Water Authority Transmission and Distribution**
- **Pearland Surface Water Treatment Plant**
- **Sealy Groundwater Treatment Expansion**
- **West Harris County Regional Water Authority Transmission and Distribution**

Other Strategies

- **Brazoria County Interruptible Supplies for Irrigation** –This strategy uses interruptible supplies to meet the needs of irrigation within Brazoria County, mirroring the system of annual contracts currently used in the area for surface-water-based irrigation.

- **Brazos Saltwater Barrier**—A proposed gated structure on the lower Brazos above Freeport to protect lower basin intakes from the seasonal saltwater influence, which is expected to worsen as the basin is fully utilized.

- **Freeport Desalination** – A proposed facility in Freeport for desalination of seawater for municipal use, thereby enhancing flows for manufacturing uses in the lower Brazos River basin.

The 2011 Region H Water Plan meets all projected water demands, at an estimated capital cost of approximately $12.0 billion for the recommended water management strategies. A summary of the selected strategies, their yields and their costs is shown in *Table ES-7*. *Table ES-8* shows the recommended combination of strategies required for each County to meet its projected water shortages. An in-depth discussion of the recommended plan is contained in *Chapter 4: Identification, Evaluation and Selection of Water Management Strategies Based on Needs*.

ES.4.3 Impacts of the 2007 State Water Plan on Galveston Bay Inflows

As a supplement to a 2009 study conducted by the RHWPG on environmental flows in the year 2060, another study was conducted to determine the impacts of management strategies in the decades of 2010, 2020, 2030, 2040, 2050, and 2060. This study over the entire planning horizon took into account impacts from upstream return flows from and reuse within Region C to determine overall variation in inflows to Galveston Bay. In general, the study demonstrated that near-term reductions in return flows from the upper Trinity River Basin were mitigated over time due to increased demands in the upper basin. These increased flows also counteracted increased used of water supplies by Region H.

ES.4.4 Socioeconomic Impact of Not Addressing Shortages

Water supply is critical to public health, and failure to provide water would severely constrain economic and population growth in Region H. The TWDB has developed an assessment of the impacts of failing to meet the projected shortages within Region H, which is included in the 2011 RWP.

ES.5 Impacts of Management Strategies on Water Quality and Agricultural Areas

Both surface and groundwater in Region H are generally of good quality, and can be used with conventional treatment only. Advanced treatment measures are recommended to develop direct wastewater reuse projects. The management strategies recommended in the plan are not anticipated to directly affect water quality in most basins, although the reduction of in-stream flows due to full use of water rights may indirectly increase the concentration of some contaminants (by reducing the overall volume of water). The Brazos Saltwater Barrier is specifically recommended to improve water quality in the lower Brazos basin, by preventing seawater from migrating above Freeport during periods of low flows. The Luce Bayou Transfer and the transfer of water to SJRA from Trinity River supplies will introduce Trinity River Water into the San Jacinto River Basin. It should be noted that Trinity River water is currently transferred into Harris County via other conveyances. The reuse of wastewater will produce a brine concentrate, which must be judiciously discharged to prevent adverse environmental impacts.

Reservoirs within Region H are anticipated to experience increased impacts as water supplies are utilized at a greater level. However, modeling the use of these supplies over the known hydrologic period of record indicates that lower lake levels do not persist for long periods outside of the drought of record.

Agricultural areas in Region H are generally served by a combination of groundwater and with surface water supplies, depending primarily on the location of use and the application. The groundwater use is not projected to change during the planning period. Surface water used for irrigation is typically contracted on a year-to-year basis. All irrigation needs are met in the plan, through a combination of water conservation and supply from new and existing sources.

ES.6 Water Conservation and Drought Management Plans

Water conservation is recommended for all water user groups, although it is calculated and applied in the tables only for WUGs with shortages and WUGs with conservation plans that lend themselves to incorporation into the RWP. Surveys of municipal WUGs indicated that 86 percent of WUGs that were assigned water conservation as a strategy in the 2006 RWP beginning in the year 2010 had implemented water conservation plans. In some cases, the generic water conservation plans used in the 2006 RWP were replaced with actual targets set forth in these conservation plans.

Drought management plans are required for all WUGs to address brief periods of water shortage, but are not recommended as long-term management strategies, based on studies conducted during the first biennium of the 2011 planning phase. Drought management plans typically force conservation over a limited period of time. However, the drought of record that this plan must address lasted approximately five years. To achieve a sustained reduction in demand, water conservation strategies must be implemented, so that water users do not perceive the required changes as being temporary. Sample water conservation and drought management plans are included in *Chapter 6*.

ES.7 Protection of Water Resources and Natural Resources

The management strategies recommended in this plan will fully utilize the currently available water rights in all but the Trinity River basin. The two reservoirs recommended in the Brazos River basin and the recommended transfers from the Trinity River Basin will require some environmental mitigation due to habitat impacts. The recommended reuse of wastewater will further reduce in-stream flows, particularly during drought conditions. Some of this reduction will be mitigated by an overall increase in wastewater discharges beyond the current level.

Groundwater use in the region is projected to increase within the sustainable yield of the aquifers or the regulated withdrawal cap, as applicable. The export of groundwater from its county of origin is not recommended in this plan.

The most significant water-dependant natural resource in the region is Galveston Bay. In 2009, the RHWPG completed a study of the individual impacts of management strategies on flows to Galveston Bay. The results are shown in *Table ES-9*, comparing the inflow frequencies to the GBFIG inflow targets. Recommendations to the Legislature

ES.8 Recommendations to the Legislature

The Texas Water Code guides the regional water planning groups to adopt recommendations on Unique Stream Segments, Unique Reservoir Sites, and legislative policy. *Chapter 8* of the 2011 RWP describes these recommendations in depth and a summary is provided below.

ES.8.1 **Unique Stream Segments**

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value. The selection criteria established within the Texas Water Code are as follows:

- Biological Function
- Hydrologic Function
- Riparian Conservation Area
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value
- Threatened or Endangered Species/Unique Natural Communities

Stream segments designated by the legislature as having unique ecological value cannot be developed as reservoir sites by the State or any political subdivision of the State. After consideration of the above factors during the development of the 2006 RWP, the eight streams listed in *Table ES-1* were recommended as Streams of Unique Ecological Value in Region H. These segments were subsequently designated by the Texas State Legislature. No additional sites were nominated for designation in the 2011 RWP.

The entire stream segment length was designated for Armand Bayou and Menard Creek (segment within Region H). For the remaining six streams, only those portions adjacent to or within riparian conservation areas were designated as unique streams.

Table ES-1
Stream Segments Recommended as Ecologically Unique

Stream Segments (Not in priority order)	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Lake Creek	Brazoria
Menard Creek	Liberty, Hardin*, Polk
Oyster Bayou	Chambers

*Hardin County portion is in Region I.

ES.8.2 **Unique Reservoir Sites**

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs. Designation by the Legislature as a unique reservoir site prevents the State from constructing major infrastructure (such as major highways) within the project limits. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected five surface water reservoir projects, Allens Creek, and Dow, GCWA, Brazoria County, and Fort Bend County Off-channel reservoirs, for inclusion in the 2011 Regional Water Plan. Three other sites, Little River, Little River Off-Channel, and Bedias Reservoirs, were considered in past plans; Little River Off-Channel has been retained as an alternative reservoir site. The RHWPG recommends four Unique Reservoir Sites in the 2011 RWP: Allens Creek, Little River, Little River Off-Channel, and Bedias Reservoirs. *Table E-2* lists these sites along with a short description.

Table ES-2
Reservoir Sites Recommended as Unique

Name	County	General Location
Allens Creek	Austin	1 Mile N. of the City of Wallis
Little River	Milam	Main stem of Little River, immediately upstream of its confluence with the Brazos River
Little River, Off-Channel	Milam	Beaver Creek, approx. 5 Miles NE of City of Milano
Bedias Reservoir	Madison (Principally)	Bedias Creek, 3.5 Miles W. of State Hwy 75

ES.8.3 Regulatory, Administrative, and Legislative Recommendations

Section 357.7(a)(10) of the Texas Water Development Board regional water planning guidelines requires that a regional water plan include recommendations for regulatory, administrative, and legislative changes. These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed towards the Texas Commission on Environmental Quality (TCEQ), that administrative recommendations are directed towards the Texas Water Development Board (TWDB), and that legislative recommendations are directed towards the State of Texas Legislature.

The Region H Water Planning Group has currently adopted the following regulatory, administrative, and legislative recommendations:

Regulatory and Administrative Recommendations

- Clarify the agency rules to address consistency with the regional water plans.
- Clarify agency rules on quantitative environmental analysis.
- Modify the rules for wastewater permitting so that reclamation facilities are assessed in conjunction with their source water facilities.

Legislative Recommendations

- Remove barriers to interbasin transfers of water.
- Increase funding for the Bays and Estuaries programs of state resource agencies and for additional monitoring and research to scientifically determine freshwater inflow needs.
- Maintain the current rule of capture basis of groundwater law within Texas in all areas not subject to defined subsidence or groundwater conservation districts.
- Support development of Groundwater Conservation Districts to protect current groundwater users, and encourage these districts to study and manage aquifer storage and recovery.
- Establish financing mechanisms for development of new water supply projects identified within the adopted regional water plans.

- Continue funding of the State of Texas Groundwater Availability Modeling effort.
- Establish funding for agricultural research into the area of efficient irrigation practices.
- Implement the programs recommended by the Water Conservation Implementation Task Force.
- Establish funding for research in advanced conservation technologies.
- Resolve the issues related to water rights permitting for indirect reuse, and advocate water reuse statewide.
- Establish flood damage liability limits for water supply reservoirs.
- Direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.
- Continue funding of the Regional Water Planning process.

Infrastructure Financing Recommendations

- Increase the funding of the State Participation Program as needed to allow development of water supply projects sized to meet projected long-term demands.
- Increase the funding of the State Revolving Fund Programs in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.
- Increase funding of the State Loan Program to allow financing of near-term infrastructure cost projections.
- Increase funding of the Agricultural Water Conservation loan program, leverage Federal grant programs by providing the local matching share, and consider adding a one-time grant or subsidy program to stimulate early adoption of conservation practices by individual irrigators.
- Continue State and Federal support of the Texas Community Development program, and increase the allocation of funds for the Small Town Environment Program.
- Increase funding of the Regional Water Supply and Wastewater Facilities Planning Program in anticipation of upcoming development throughout the state, and expand the program to include the costs for preliminary engineering design and development of detailed engineering cost estimates of recommended facilities.
- Support continued and increased funding of the USDA Rural Utilities Service programs at the Federal level, and fund the State Rural Water Assistance Fund.
- Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs.
- Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.
- Support regulatory changes that will allow USACE to increase water supply storage in new reservoirs that they construct and manage, and investigate other alternatives for increased involvement of USACE in funding water supply projects.

- Region H supports the forming of regional facilities and encourages the State to remove any impediments to these entities, including restrictions to the use of public/private partnerships. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

ES.9 Water Infrastructure Financing Recommendations

Approximately $12.0-billion in capital costs were identified for meeting needs throughout the planning period. These capital costs primarily represent infrastructure (wells, pump stations, treatment facilities, transmission mains, etc) required to implement water management strategies at the wholesale water provider and WUG level. These costs do not include annual costs and debt service associated with the new projects. Additionally, these costs do not represent improvements that will be required within individual WUGs for providing adequate water supply.

With the assistance of the RHWPG, the TWDB conducted a survey of water utilities. Anticipated costs developed as part of the RWP were submitted to WUGs in order to determine their interest in pursuing one or more of the financial assistance programs offered by TWDB. Please see *Chapter 9* for an overview of this methodology and the results for Region H.

ES.10 Public Participation

During the course of developing the 2011 RWP, the RHWPG conducted numerous public meetings corresponding with various phases of plan development. In addition, the group provided notice for two public hearings and two public meetings corresponding to the initiation of the two bienniums of planning within this phase and discussion of the development and approval of population and water demand projections for the 2011 RWP.

After the submittal of the IPP to TWDB by March 1, 2010, the RHWPG also conducted three public hearings to receive comment from the public. Details of these meetings and comments from the public and interested agencies are provided in *Chapter 10* of the RWP.

Figure ES-3
Region H Location Map

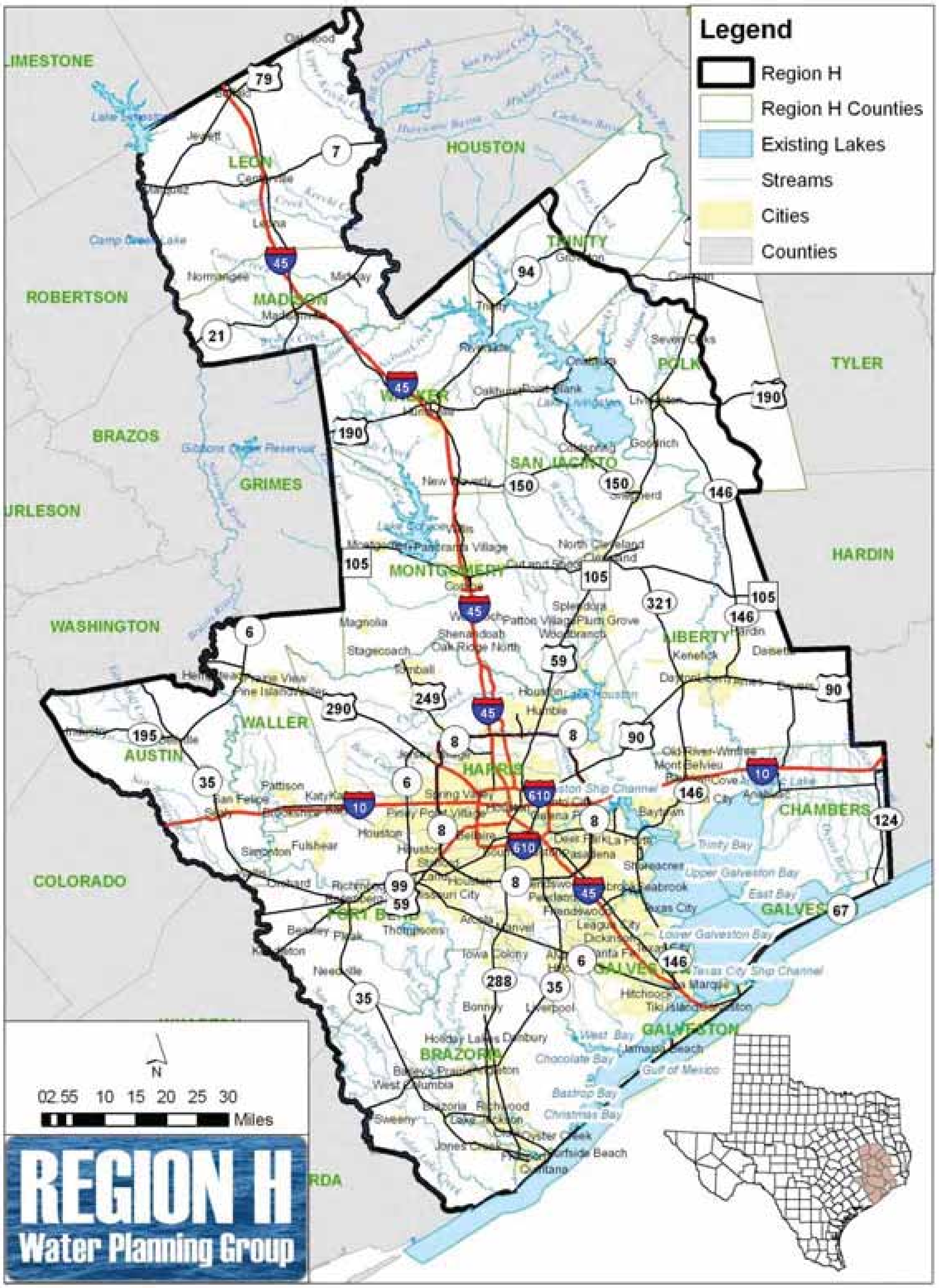


Table ES-3
Public Repositories of the Region H Regional Water Plan

AUSTIN COUNTY County Clerk County Courthouse 1 East Main Bellville, TX 77418	**AUSTIN COUNTY** Gordon Library 917 Circle Drive Sealy, TX 77474
BRAZORIA COUNTY County Clerk County Courthouse 111 East Locust Angleton, TX 77515	**BRAZORIA COUNTY** Angleton Public Library 401 East Cedar Angleton, TX 77515
CHAMBERS COUNTY County Clerk County Courthouse Anahuac, TX 77514	**CHAMBERS COUNTY** Chambers County Library – Main Branch 202 Cummings Anahuac, TX 77514
FORT BEND COUNTY County Clerk 301 Jackson Richmond, TX 77469	**FORT BEND COUNTY** George Memorial Library 1001 Golfview Richmond, TX 77469
GALVESTON COUNTY County Clerk County Courthouse 722 Moody Galveston, TX 77550	**GALVESTON COUNTY** Rosenberg Library 2310 Sealy Galveston, TX 77550
HARRIS COUNTY County Clerk Harris County Administration Building 1001 Preston Avenue Houston, TX 77002	**HARRIS COUNTY** Houston Public Library 1st Floor, Bibliographic Information Center 500 McKinney Houston, TX 77002
LEON COUNTY County Clerk Leon County Courthouse Centerville, TX 75833	**LEON COUNTY** Leon County Library 129 East Main Centerville, TX 75833
LIBERTY COUNTY County Clerk County Courthouse 1923 Sam Houston Liberty, TX 77575	**LIBERTY COUNTY** Sam Houston Regional Library And Research Center FM1011 Liberty, TX 77575

MADISON COUNTY
County Clerk
101 West Main, Room 102
Madisonville, TX 77864

MONTGOMERY COUNTY
County Clerk
County Courthouse
301 N. Thompson
Conroe, TX 77301

POLK COUNTY
County Clerk
County Courthouse, 1st Floor
101 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
County Clerk
County Courthouse
#1 Highway 150
Coldspring, TX 77331

TRINITY COUNTY
County Clerk
County Courthouse
1st and Main
Groveton, TX 75845

WALKER COUNTY
County Clerk
County Courthouse
1100 University Avenue
Huntsville, TX 77340

WALLER COUNTY
County Clerk
County Courthouse
836 Austin Street
Hempstead, TX 77445

MADISON COUNTY
Madison County Library
605 South May
Madisonville, TX 77864

MONTGOMERY COUNTY
Montgomery County Central Library
104 Interstate 45 North
Conroe, TX 77301

POLK COUNTY
Murphy Memorial Library
601 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
Coldspring Library
220 South Bonham
Coldspring, TX 77331

TRINITY COUNTY
Blanche K. Werner Library
Highway 19
Trinity, TX 75862

WALKER COUNTY
Huntsville Public Library
1216 – 14th Street
Huntsville, TX 77340

WALLER COUNTY
Waller County Library - Brookshire/Pattison
3815 Sixth Street
Brookshire, TX 77423

Table ES-4
Region H Population Projections

County	2010	2020	2030	2040	2050	2060
Austin	27,173	30,574	32,946	34,355	35,031	35,958
Brazoria	305,649	354,708	401,684	444,981	490,875	538,795
Chambers	34,282	40,786	46,838	52,083	57,402	62,850
Fort Bend	550,121	719,737	893,875	1,090,710	1,348,851	1,643,825
Galveston	268,714	284,731	294,218	298,057	300,915	302,774
Harris	4,078,231	4,629,335	5,180,439	5,731,543	6,282,647	6,833,751
Leon	18,231	21,137	22,863	22,971	22,809	23,028
Liberty	81,930	94,898	107,335	119,519	132,875	147,845
Madison	13,905	14,873	15,644	16,364	17,002	17,560
Montgomery	453,369	588,351	751,702	931,732	1,169,199	1,444,999
Polk (part)	37,650	42,196	45,779	48,561	51,535	54,380
San Jacinto	27,443	32,541	36,617	39,159	40,630	41,299
Trinity (part)	11,571	12,485	12,786	12,631	12,131	11,673
Walker	70,672	77,915	81,402	80,547	80,737	80,737
Waller	41,137	51,175	62,352	74,789	89,598	106,608
Region H Total	6,020,078	6,995,442	7,986,480	8,998,002	10,132,237	11,346,082

Table ES-5
Region H Water Demand Projections (in ac-ft/yr)

AUSTIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	4,123	4,658	5,027	5,191	5,278	5,446
Manufacturing	210	233	253	272	288	313
Steam-Electric	0	0	0	0	0	0
Mining	51	56	59	62	65	67
Irrigation	10,617	10,617	10,617	10,617	10,617	10,617
Livestock	1,615	1,615	1,615	1,615	1,615	1,615
Total Water Use	16,616	17,179	17,571	17,757	17,863	18,058
BRAZORIA	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	47,184	53,523	59,656	65,134	71,567	78,598
Manufacturing	260,239	286,554	309,841	333,348	354,093	379,241
Steam-Electric	0	0	0	0	0	0
Mining	4,104	4,502	4,737	4,969	5,201	5,419
Irrigation	135,033	123,115	118,544	115,788	115,788	115,788
Livestock	1,614	1,614	1,614	1,614	1,614	1,614
Total Water Use	448,174	469,308	494,392	520,853	548,263	580,660
CHAMBERS	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	4,985	5,854	6,648	7,338	8,067	8,863
Manufacturing	11,802	12,959	13,987	15,011	15,932	17,122
Steam-Electric	4,435	3,536	4,134	4,863	5,751	6,834
Mining	37,422	40,532	42,427	44,286	46,130	47,742
Irrigation	117,777	117,777	117,777	117,777	117,777	117,777
Livestock	462	462	462	462	462	462
Total Water Use	176,883	181,120	185,435	189,737	194,119	198,800
FORT BEND	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	109,869	143,023	174,552	208,691	251,533	300,689
Manufacturing	6,863	7,199	7,468	7,685	7,829	7,410
Steam-Electric	66,026	68,046	79,553	93,582	110,682	131,527
Mining	3,010	3,070	3,105	3,138	3,169	3,196
Irrigation	53,455	53,455	53,455	53,455	53,455	53,455
Livestock	1,171	1,171	1,171	1,171	1,171	1,171
Total Water Use	240,394	275,964	319,304	367,722	427,839	497,448
GALVESTON	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	46,090	47,390	47,818	47,487	47,393	47,641
Manufacturing	41,005	44,330	47,046	49,692	51,967	55,491
Steam-Electric	5,034	4,013	4,692	5,519	6,528	7,757
Mining	265	279	286	293	300	307
Irrigation	10,342	10,342	10,342	10,342	10,342	10,342
Livestock	325	325	325	325	325	325
Total Water Use	103,061	106,679	110,509	113,658	116,855	121,863

Table ES-5 (Cont.)
Region H Water Demand Projections (in ac-ft/yr)

HARRIS	2010	2020	2030	2040	2050	2060
Municipal	709,300	789,397	868,320	948,412	1,030,899	1,119,593
Manufacturing	395,997	424,761	449,218	470,881	487,094	478,957
Steam-Electric	7,728	23,962	28,015	32,955	38,977	46,317
Mining	1,282	1,434	1,529	1,624	1,720	1,805
Irrigation	15,300	15,300	15,300	15,300	15,300	15,300
Livestock	1,133	1,133	1,133	1,133	1,133	1,133
Total Water Use	1,130,740	1,255,987	1,363,515	1,470,305	1,575,123	1,663,105
LEON	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	2,128	2,376	2,489	2,456	2,414	2,437
Manufacturing	714	842	967	1,093	1,207	1,313
Steam-Electric	0	0	0	0	0	0
Mining	1,517	1,464	1,435	1,409	1,384	1,364
Irrigation	542	542	542	542	542	542
Livestock	1,691	1,691	1,691	1,691	1,691	1,691
Total Water Use	6,592	6,915	7,124	7,191	7,238	7,347
LIBERTY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	10,470	11,759	12,980	14,211	15,629	17,362
Manufacturing	393	465	537	611	678	736
Steam-Electric	2,962	4,240	4,957	5,831	6,896	8,195
Mining	8,730	8,753	8,766	8,778	8,790	8,800
Irrigation	82,901	82,901	82,901	82,901	82,901	82,901
Livestock	757	757	757	757	757	757
Total Water Use	106,213	108,875	110,898	113,089	115,651	118,751
MADISON	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	1,793	1,867	1,921	1,954	2,010	2,075
Manufacturing	260	289	316	343	367	398
Steam-Electric	0	0	0	0	0	0
Mining	24	24	24	24	24	24
Irrigation	19	19	19	19	19	19
Livestock	750	750	750	750	750	750
Total Water Use	2,846	2,949	3,030	3,090	3,170	3,266
MONTGOMERY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	74,871	98,947	122,197	146,984	180,292	219,432
Manufacturing	2,045	2,332	2,608	2,883	3,126	3,392
Steam-Electric	5,046	8,537	9,981	11,741	13,886	16,502
Mining	480	509	526	543	559	573
Irrigation	66	66	66	66	66	66
Livestock	510	510	510	510	510	510
Total Water Use	83,018	110,901	135,888	162,727	198,439	240,475

Table ES-5 (Cont.)
Region H Water Demand Projections (in ac-ft/yr)

POLK	2010	2020	2030	2040	2050	2060
Municipal	5,062	5,632	6,046	6,335	6,693	7,088
Manufacturing	0	0	0	0	0	0
Steam-Electric	0	0	0	0	0	0
Mining	29	31	32	33	34	35
Irrigation	0	0	0	0	0	0
Livestock	134	134	134	134	134	134
Total Water Use	5,225	5,797	6,212	6,502	6,861	7,257
SAN JACINTO	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	3,153	3,616	3,964	4,120	4,207	4,251
Manufacturing	48	52	56	60	63	68
Steam-Electric	0	0	0	0	0	0
Mining	30	29	28	27	26	26
Irrigation	667	667	667	667	667	667
Livestock	284	284	284	284	284	284
Total Water Use	4,182	4,648	4,999	5,158	5,247	5,296
TRINITY	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	1,203	1,260	1,255	1,206	1,145	1,102
Manufacturing	0	0	0	0	0	0
Steam-Electric	0	0	0	0	0	0
Mining	6	6	6	6	6	6
Irrigation	467	467	467	467	467	467
Livestock	211	211	211	211	211	211
Total Water Use	1,887	1,944	1,939	1,890	1,829	1,786
WALKER	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	16,920	16,607	17,244	16,240	16,042	15,786
Manufacturing	3,208	3,718	4,188	4,666	5,083	5,517
Steam-Electric	0	0	0	0	0	0
Mining	13	13	13	13	13	13
Irrigation	11	11	11	11	11	11
Livestock	632	632	632	632	632	632
Total Water Use	20,784	20,981	22,088	21,562	21,781	21,959
WALLER	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal	5,713	7,003	8,469	10,084	12,093	14,454
Manufacturing	89	101	112	123	133	144
Steam-Electric	0	0	0	0	0	0
Mining	13	13	13	13	13	13
Irrigation	22,978	22,978	22,978	22,978	22,978	22,978
Livestock	939	939	939	939	939	939
Total Water Use	29,799	31,101	32,578	34,204	36,223	38,595

Table ES-5 (Cont.)
Region H Water Demand Projections (in ac-ft/yr)

REGION H TOTAL	2010	2020	2030	2040	2050	2060
Municipal	1,042,864	1,192,912	1,338,586	1,485,843	1,655,262	1,844,817
Manufacturing	722,873	783,835	836,597	886,668	927,860	950,102
Steam-Electric	91,231	112,334	131,332	154,491	182,720	217,132
Mining	57,043	60,782	63,053	65,285	67,501	69,457
Irrigation	450,175	438,257	433,686	430,930	430,930	430,930
Livestock	12,228	12,228	12,228	12,228	12,228	12,228
Total Water Use	2,376,414	2,600,348	2,815,482	3,035,445	3,276,501	3,524,666

Table ES-6
Summary of Water Supplies Available for Study Years 2010, 2030 and 2060

Supply Source	Supply Available (acre-feet/year)		
	Year 2010	**Year 2030**	**Year 2060**
Groundwater			
Gulf Coast Aquifer	812,709	685,529	685,843
Carrizo-Wilcox Aquifer	10,493	9,756	9,610
Queen City Aquifer	7,906	7,906	7,906
Sparta Aquifer	17,414	17,414	17,414
Brazos River Alluvium	41,539	41,539	41,539
Yegua-Jackson Aquifer	6,400	6,400	6,400
Undifferentiated Aquifer	1,117	1,117	1,117
Subtotal	**897,578**	**769,661**	**769,829**
Surface Water			
Neches River Basin[1]	63,863	63,946	64,177
Neches-Trinity Coastal Basin	21,754	21,754	21,754
Trinity River Basin	1,568,530	1,489,530	1,568,530
Trinity-San Jacinto Coastal Basin	34,313	34,313	34,313
San Jacinto River Basin	321,800	314,000	302,300
San Jacinto-Brazos Coastal Basin	33,051	33,051	33,051
Brazos River Basin[1]	573,081	573,278	573,342
Brazos-Colorado Coastal Basin	12,019	12,019	12,019
Local Supplies, all basins[3]	30,549	31,599	31,895
Subtotal	**2,658,960**	**2,573,490**	**2,641,381**
Total	**3,556,538**	**3,343,151**	**3,411,210**

[1] Supplies represent current allocations to Region H only. Supplies include 63,863 acre-ft per year of firm water currently contracted from upstream LNVA to Region H customers. Total LNVA supply is greater but may not be available to Region H.

[2] Supplies include 155,031 acre-ft per year of firm water currently contracted from upstream BRA system reservoirs to Region H customers. The total BRA supply is greater but is not available to Region H. The remaining Brazos River Basin supply is comprised of Lower Brazos Basin permits owned by Dow Chemical, GCWA, NRG, Brazosport Water Authority, and private irrigators.

[3] Local supplies refer to stock ponds and similar supplies that meet localized demands, predominantly from livestock or mining activities.

Table ES-7
Recommended Water Management Strategies

WMS	Max Project Volume (ac-ft/yr)	WWP Capital Cost $	WUG Capital Cost $	Starting Decade
Conservation Strategies:				
Industrial Conservation	TBD	$0	TBD	2010
Irrigation Conservation	77,881	$0	$757,436	2010
Municipal Conservation	105,494	$0	$0	2010
Contractual Strategies:				
Expand/Increase Current Contracts	142,599	$0	See Contracts	2010
New Contracts from Existing Supplies	83,558	$0	See Contracts	2010
Reallocation of Existing Supplies	N/A	$0	See Contracts	2010
TRA to SJRA Contract	76,476	$302,781,597	See Contracts	2040
TRA to Houston Contract	123,524	See Luce Bayou	See Contracts	2030
WUG-Level Contracts[1]	N/A	$0	$2,390,273,157	2010
WWP Contracts	N/A	$0	$0	2010
Groundwater Strategies:				
Expanded Use of Groundwater	90,617	$0	$165,928,999	2010
Interim Strategies	45,512	$0	$86,701,535	2010
New Groundwater Wells for Livestock	41	$0	$18,635	2020
Groundwater Reduction Plans:				
CHCRWA GRP	4,806	See CHCRWA Trans.	$0	2010
COH GRP	TBD	See COH Treatment	$58,235,873	2010
City of Missouri City GRP	17,562	$92,070,990	$6,618,706	2010
Fort Bend MUD 25 GRP	589	$0	$776,145	2020
Fort Bend WCID 2 GRP	5,753	$24,828,857	$0	2020
NFBWA GRP[2]	106,402	See NFBWA Trans.	$1,638,063	2020
NHCRWA GRP[2]	117,755	See NHCRWA Trans.	$17,814,585	2010
Pecan Grove GRP	1,700	$0	$15,960,000	2020
Richmond/Rosenberg GRP	7,500	$117,220,150	$0	2020
River Plantation GRP	368	$0	$484,926	2010
SJRA WRAP[3]	129,010	$900,000,000	$217,856,853	2020
Sugar Land GRP	9,796	$161,360,049	$6,360,101	2020
WHCRWA GRP[2]	78,839	See WHCRWA Trans	$35,268,970	2010
Infrastructure Strategies:				
CHCRWA Transmission Line	4,806	TBD	N/A	2010
CHCRWA Internal Distribution	4,806	TBD	N/A	2010
CLCND West Chambers System	2,800	$20,380,000	See Contracts	2020
COH Distribution Expansion	TBD	$261,040,000	N/A	2010
COH Treatment Expansion	Varies by decade	$2,045,672,161	N/A	2010
Harris County MUD 50 WTP	632	$0	$6,131,600	2020
Huntsville WTP	11,200	$61,023,906	$0	2010
LLWSSSC Surface Water Project	954	$0	$3,087,974	2010
Luce Bayou Transfer	450,000	$253,916,914	$0	2020

NFBWA Internal Distribution	106,402	$225,000,000	N/A	2020
NFBWA Shared Transmission Line	71,876	$213,000,000	N/A	2020
NHCRWA Internal 2010 Distribution	34,714	$153,149,640	N/A	2010
NHCRWA Internal 2020 Distribution	91,167	$345,292,192	N/A	2020
NHCRWA Internal 2030 Distribution	117,755	$37,439,584	N/A	2030
NHCRWA Transmission 2010	34,714	$80,690,624	N/A	2010
NHCRWA Transmission 2020	91,167	$172,558,512	N/A	2020
NHCRWA Transmission 2030	117,755	$0	N/A	2030
Pearland SWTP	13,420	$0	$265,000,000	TBD
Sealy GW Treatment Expansion	888	$0	$6,450,000	2020
WHCRWA Internal Distribution	78,839	$552,472,000	N/A	2010
WHCRWA Transmission Line	78,839	$290,084,193	N/A	2010
Reservoir Strategies:				
Allens Creek Reservoir	99,650	$222,752,400	See Contracts	2020
Brazoria County Off-channel Reservoir	24,100	$173,898,602	See Contracts	2060
Dow Off-channel Reservoir	21,800	$124,468,000	See Contracts	2020
Fort Bend County Off-channel Reservoir	46,000	$202,514,788	See Contracts	2050
GCWA Off-channel Reservoir	39,500	$197,448,012	See Contracts	2030
Reuse Strategies:				
Fulshear Reuse	430	$0	$566,625	TBD
Houston Indirect Reuse	128,801	$0	$721,822,850	2040
Montgomery MUD 8/9 Indirect Reuse	1,120	$0	$12,245,687	2016
NHCRWA Indirect Reuse	16,300	$0	$66,778,694	2040
Wastewater Reuse for Industry	67,200	$332,051,761	$0	2060
Wastewater Reclamation for Mun. Irrigation	36,388	$0	$48,043,249	2030
Permit Strategies:				
BRA System Operations Permit	25,400	TBD	See Contracts	2020
Houston Bayous Permit*	0	$20,956,000	$0	2020
Other Strategies:				
Brazoria Co. Interruptible Supplies for Irr.	104,977	$0	$0	2010
Freeport Desalination Plant	33,600	$255,699,000	See Contracts	2050
Brazos Saltwater Barrier	N/A	$44,470,739	$0	2030

1. WUG-level costs for a number of WMS are indicated as “See Contracts”. The WUG-level costs for these strategies will be infrastructure costs associated with implementing *future* contracts from WWPs. For simplification, these costs are collectively represented under the “WUG-Level Contracts” WMS, as common infrastructure from a WUG may treat or transmit water from multiple WMS.
2. Yield value includes surface water transmission volume and is therefore not additional yield.
3. Includes supply volume of TRA to SJRA Contract
4. The Houston Bayous Permit has not yet been approved by TCEQ.

Table ES-8
Recommended Water Management Strategies by County (in ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Austin						
Initial Shortage	0	-739	-1,240	-1,496	-1,635	-1,865
Expanded GW	0	739	1,240	1,496	1,635	1,865
Municipal Conservation	0	223	251	265	273	285
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	223	251	265	273	285
Brazoria						
Initial Shortage	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Expanded GW	0	4,049	12,988	13,515	15,658	16,209
Municipal Conservation	1,476	2,610	2,978	3,249	3,567	3,918
Contract Expansions	7,750	7,750	7,750	7,750	7,750	7,750
Net Shortage	-141,681	-172,351	-187,918	-214,074	-239,430	-271,322
Irrigation Conservation	18,792	18,792	18,792	18,792	18,792	18,792
Wastewater Reclamation for Mun. Irrigation	0	0	116	227	344	465
Brazoria Co. Interruptible Supplies for Irr.	98,189	86,759	64,000	64,000	64,000	64,000
Reallocate Existing Supply	13,694	13,694	13,895	13,988	14,019	13,694
Interim Strategies	24,916	0	0	0	0	0
GCWA Offchannel Reservoir	0	0	39,500	39,500	39,500	39,500
Allens Creek Lake/Reservoir	0	45,277	41,779	66,665	58,092	66,196
BRA System Operations Permit	0	3,010	3,010	3,010	3,010	3,010
Brazoria OCR	0	0	0	0	0	24,000
Freeport Desalination Plant	0	0	0	0	33,600	33,600
Dow Offchannel Reservoir	0	21,800	21,800	21,800	21,800	21,800
New Groundwater Wells for Livestock	0	27	27	27	27	27
Total after Recommendations	13,910	17,008	15,001	13,935	13,754	13,762
Chambers						
Initial Shortage	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Expanded GW	0	577	681	796	905	1,010
Municipal Conservation	137	195	219	239	263	291
Contract Expansions	0	0	0	0	0	0
Net Shortage	-42,383	-46,640	-49,931	-53,216	-56,444	-59,764
Irrigation Conservation	24,018	24,018	24,018	24,018	24,018	24,018
CLCND W Chambers System	0	1,691	1,978	2,235	2,511	2,804
Reallocate Existing Supply	21,010	21,264	21,389	21,509	21,627	21,725
Interim Strategies	903	0	0	0	0	0
New Contract from Existing Supply	13,823	17,083	19,972	22,888	25,732	28,672
Total after Recommendations[1]	17,371	17,416	17,426	17,434	17,444	17,455
Fort Bend						
Initial Shortage	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Expanded GW	0	6,886	3,423	3,813	4,378	5,052
Municipal Conservation	1,435	7,077	10,277	12,253	14,678	17,497
Contract Expansions	0	367	1,295	1,226	1,225	1,016
Net Shortage	1,349	2,920	-37,613	-67,088	-103,342	-155,383
Irrigation Conservation	5,197	5,197	5,197	5,197	5,197	5,197
WHCRWA GRP	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
NFBWA GRP	0	0	0	0	0	0
Sugar Land GRP	0	488	4,921	4,835	4,915	4,961
Missouri City GRP	0	4,401	4,401	4,401	4,401	4,401
Wastewater Reclamation for Mun. Irrigation	0	0	2,136	4,744	8,403	12,277
Fort Bend MUD 25 GRP	0	589	589	589	589	589
BRA System Operations Permit	0	3,611	15,860	22,340	22,340	22,340
Fort Bend OCR	0	0	0	0	90	45,943
Allens Creek Lake/Reservoir	0	0	0	6,605	25,864	16,145
TRA to Houston Contract	0	0	13,813	27,824	39,179	39,179
Reallocate Existing Supply	0	0	4,687	4,510	3,720	13,762
Fulshear Reuse	0	287	430	430	430	430
Industrial Conservation	0	558	558	558	558	558
Total after Recommendations	6,546	18,051	14,979	14,945	12,344	10,399
Galveston						
Initial Shortage	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Expanded GW	0	811	1,352	1,350	1,352	1,352
Municipal Conservation	768	846	886	896	903	914
Contract Expansions	0	25,630	25,630	25,630	25,630	25,630
Net Shortage	-15,539	10,821	10,081	9,138	8,001	6,620
Irrigation Conservation	2,392	2,392	2,392	2,392	2,392	2,392
New Contract from Existing Supply	16	23	26	29	33	37
Interim Strategies	6,410	0	0	0	0	0
Allens Creek Lake/Reservoir	0	12,101	13,234	14,175	15,310	16,687
New Groundwater Wells for Livestock	0	14	14	14	14	14
Interruptible Supplies for Irr.	6,788	0	0	0	0	0
Total after Recommendations	67	25,351	25,747	25,748	25,750	25,750
Harris						
Initial Shortage	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Expanded GW	0	15,481	27,659	27,693	27,727	27,560
Municipal Conservation	37,292	46,836	51,902	56,748	61,656	66,947
Contract Expansions	0	108,852	66,039	51,840	42,538	31,971
Net Shortage	-14,121	-23,756	-124,701	-187,430	-243,493	-332,031
New Contract from Existing Supply	23,008	31,264	38,732	54,777	54,805	54,849
NHCRWA GRP	0	0	0	0	0	0
WHCRWA GRP	-65	-258	-409	-566	-751	-968
COH GRP	0	0	0	0	0	0
Missouri City GRP	0	386	386	386	386	386
Wastewater Reclamation for Mun. Irrigation	0	0	3,268	6,616	10,027	13,431
Reallocate Existing Supply	18,253	15,276	7,308	19,232	30,220	96,881
Interim Strategies	15	0	0	0	0	0
Allens Creek Lake/Reservoir	0	15	83	336	384	622
TRA to Houston Contract	0	0	93,744	86,519	75,164	75,164
NHCRWA Indirect Reuse	0	0	0	7,300	16,300	16,300
Wastewater Reuse for Industry	0	0	0	0	0	67,200
Houston Indirect Reuse	0	0	0	66,420	114,679	128,801
Total after Recommendations	27,090	22,927	18,411	53,590	57,721	120,635

	2010	2020	2030	2040	2050	2060
Leon						
Initial Shortage	0	-376	-614	-707	-779	-908
Expanded GW	0	376	614	707	779	908
Municipal Conservation	0	126	140	124	107	116
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	126	140	124	107	116
Total after Recommendations	0	126	140	124	107	116
Liberty						
Initial Shortage	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363
Expanded GW	0	2,537	4,590	6,809	9,399	12,544
Municipal Conservation	0	539	641	744	868	995
Contract Expansions	0	0	0	0	0	0
Net Shortage	-11,846	-12,066	-13,456	-14,986	-16,794	-18,824
Irrigation Conservation	20,876	20,876	20,876	20,876	20,876	20,876
Reallocate Existing Supply	6,657	6,697	6,732	6,767	6,805	6,833
Total after Recommendations	15,687	15,507	14,152	12,657	10,887	8,885
Madison						
Initial Shortage	-1	-130	-228	-239	-323	-450
Expanded GW	0	130	228	239	323	450
Municipal Conservation	1	91	110	112	116	119
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	91	110	112	116	119
Total after Recommendations	0	91	110	112	116	119
Montgomery						
Initial Shortage	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Expanded GW	0	5,615	4,471	5,614	9,034	11,820
Municipal Conservation	4,460	6,007	7,384	8,838	10,795	13,089
Contract Expansions	0	0	0	0	0	0
Net Shortage	-13,268	-35,997	-57,658	-66,898	-100,569	-140,253
MUD 8 AND 9 Reuse	0	657	816	1,120	1,120	1,120
Wastewater Reclamation for Mun. Irrigation	0	0	1,752	3,838	6,787	10,215
SJRA WRAP	0	36,377	55,538	54,582	53,581	52,534
Interim Strategies	13,268	0	0	0	0	0
TRA To SJRA Contract	0	0	0	7,935	39,096	76,476
Total after Recommendations	0	1,037	448	577	15	92
Polk						
Initial Shortage	0	-117	-205	-272	-384	-513
Expanded GW	0	117	205	272	384	513
Municipal Conservation	0	158	173	180	187	198
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	158	173	180	187	198
Total after Recommendations	0	158	173	180	187	198

	2010	2020	2030	2040	2050	2060
San Jacinto						
Initial Shortage	0	-300	-533	-695	-793	-869
Expanded GW	0	542	928	984	1,007	1,060
Municipal Conservation	19	148	163	174	181	184
Contract Expansions	0	0	0	0	0	0
Net Shortage	19	390	558	463	395	375
Total after Recommendations	19	390	558	463	395	375
Trinity						
Initial Shortage	0	0	0	0	0	0
Expanded GW	0	36	36	21	0	0
Municipal Conservation	0	2	1	0	0	0
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	38	37	21	0	0
Total after Recommendations	0	38	37	21	0	0
Walker						
Initial Shortage	0	-815	-1,655	-1,973	-2,384	-2,853
Expanded GW	0	816	1,651	1,963	2,374	2,843
Municipal Conservation	0	68	74	89	90	92
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	69	70	79	80	82
Total after Recommendations	0	69	70	79	80	82
Waller						
Initial Shortage	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Expanded GW	0	1,447	2,231	3,644	5,382	7,431
Municipal Conservation	17	392	497	592	708	849
Contract Expansions	0	0	0	0	0	0
Net Shortage	-65	-87	-212	-343	-2,087	-4,075
Irrigation Conservation	0	0	0	0	6,606	6,606
WHCRWA GRP	65	258	409	566	751	968
Total after Recommendations	0	171	197	223	5,270	3,499

Notes:
[1]Lines for reallocation of existing supplies include only the positive portions of reallocations, as negative portions remove surplusses from some WUGs.

A. Shortage values reflect the sum of all WUG shortages without offsets for other WUG surpluses.

Table ES-9
Overall Frequencies of Meeting Monthly Inflow Targets

Inflow Target	Max H	Min Q	Min Q-Sal
Historical Frequency	66%	78%	82%
GBFIG Target Frequency	50%	60%	75%
Naturalized	68%	67%	83%
Current Conditions	63%	58%	79%
Full Authorized Diversions with Return Flows	59%	53%	75%
Full Authorized Diversions with no Return Flows	43%	43%	56%
Full Diversions with RF and Region C & H Strategies (2006 Plans)	62%	59%	77%

Contents

List of Tables

List of Figures

List of Appendices

Chapter 1 – Description of Region

1.1 Regional Water Planning in Texas

In 1997 the State Legislature, through Senate Bill 1, determined that a Texas State Water Plan for the 2000 - 2050 timeframe would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001, a new set of rules and guidelines were enacted through Senate Bill 2. With the help of the Senate Bill 2, the 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional and State Water Plans produced every five years. The 2006 Region H Water Plan and the 2007 State Water Plan were created during the last planning cycle.

1.2 Description of Region H

Region H, located along the upper Texas coast, consists of all or part of 15 counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker and Waller. The eastern portions of Trinity and Polk counties are included in the Region I planning area. The Region spans three river and four coastal basins in southeast Texas. Region H encompasses the San Jacinto River basin, the lower portions of the Trinity and Brazos River Basins, and includes part or all of the Brazos-Colorado, the San Jacinto-Brazos, the Trinity-San Jacinto and the Neches-Trinity coastal basins. This area includes the Galveston and Trinity Bay estuaries, the urbanized, rapidly growing Houston-Galveston Metropolitan Area encompassing Brazoria-Harris-Galveston-Ft. Bend and Montgomery counties, the coastal port communities of Galveston and Freeport, and agricultural areas in Austin, Chambers, Leon, Liberty, Madison, Polk, San Jacinto, Trinity, Walker and Waller counties. *Figure 1-1* is a map of the Region H area. The Region H Water Planning Group (RHWPG) is a 24 member committee representing the diverse interests of the Region. *Table 1-1* lists the RHWPG membership.

Figure 1-1

Region H Water Planning Area

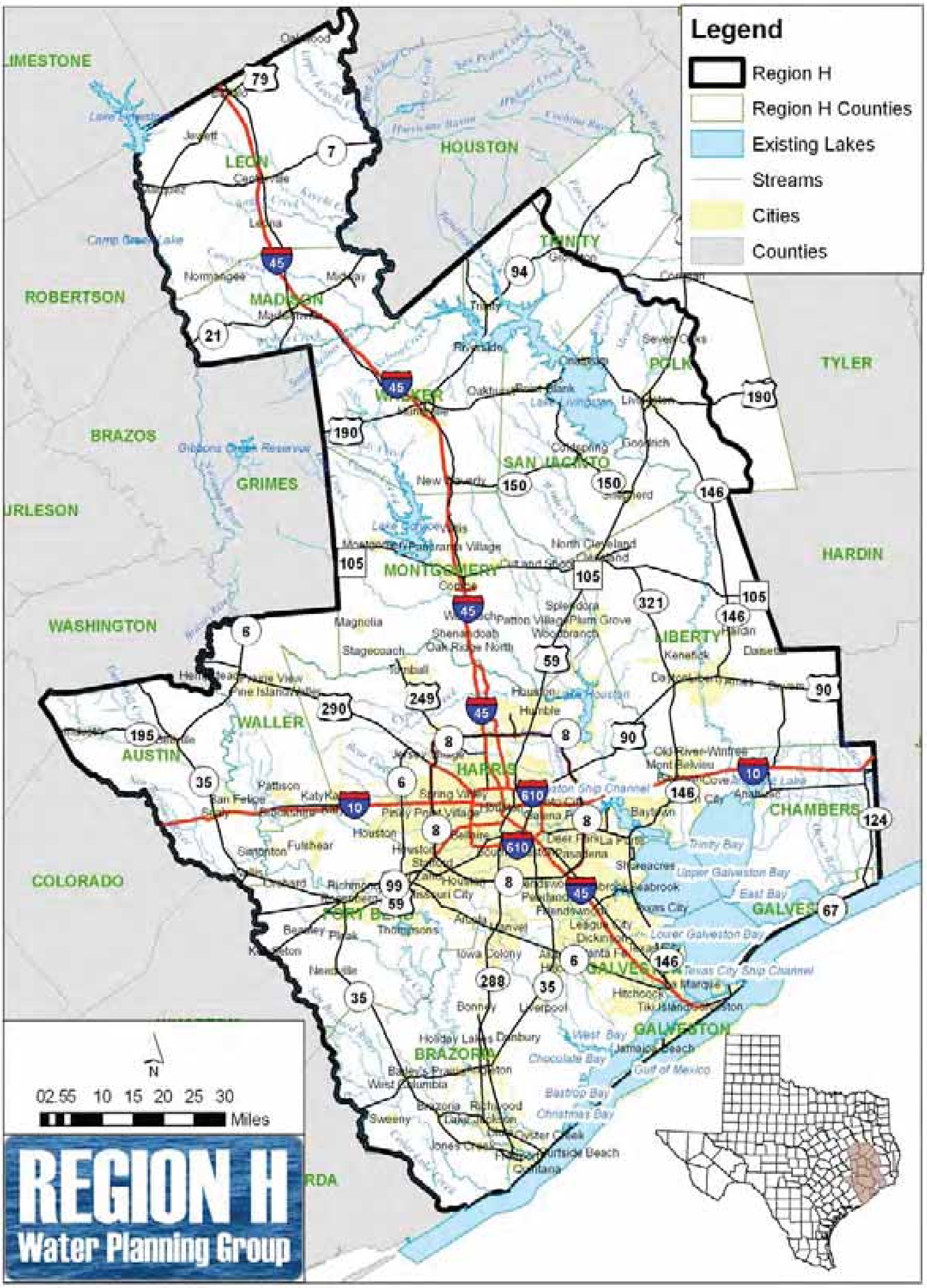


Table 1-1

Member Information for the Region H Water Planning Group

Executive Committee	
Office	**Incumbent**
Chair	Mark Evans
Vice-Chair	Ron J. Neighbors
Secretary	Reed Eichelberger
At-Large	John R. Bartos
At-Large	C. Harold Wallace
Offices	
Office	**Organization**
Administrative	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936)-588-1111 Fax: (936) 588-1114
Political Subdivision	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936)-588-1111 Fax: (936) 588-1114
NOTES: Administrative Office manages records. Political Subdivision is the entity eligible to apply for State grant funds.	

Table 1-1

(continued)

Voting Membership			
Category	**Member**	**Organization**	**County (Location of Interest)**
Agriculture	Pudge Wilcox Feb 2007 – Present	CLCND	Chambers
	Robert Bruner March 1998 – Present	Rancher	Walker
Counties	John Blount, P.E. Sept 2004 – Present	Harris County	Harris
	Mark Evans March 1998 – Present	Trinity County	Trinity
	Art Henson Nov 2009 – Present	Madison County	Madison
Electric Generating Utilities	Ted Long August 2008 – Present	NRG Energy	Harris
Environmental	John R. Bartos March 1998 – Present	Galveston Bay Foundation	Harris
Industries	Gena Leathers Sept 2009 – Present	Dow Chemical Company	Brazoria
	Glynna Leiper August 2008 – Present	Exxon-Mobil Corp.	Harris
Municipalities	Robert Istre July 2003 – Present	Gulf Coast Water Authority	Galveston
	Jun Chang Nov 2008 – Present	City of Houston	Harris, Fort Bend, Montgomery
Public	Roosevelt Alexander March 1998 – Present	Retired	Waller
River Authorities	Reed Eichelberger March 1998 – Present	San Jacinto River Authority	Montgomery (service in central portion of region)
	John Hoffmann Feb 2009 – Present	Brazos River Authority	McLennan (service in west and southwest portion of region)
	Danny F. Vance March 1998 – Present	Trinity River Authority	Tarrant (service in east and southeast portion of region
Small Business	John Howard May 2007 – Present	Howard Farms	Austin
	Bob Herbert May 2007 - Present	Robert Hebert and Associates	Fort Bend
	Steve Tyler March 1998 – Present	Steve Tyler Creative Solutions	Trinity
Water Districts	Marvin Marcell July 1998 – Present	Fort Bend Subsidence District	Fort Bend
	Ron J. Neighbors March 1998 – Present	Harris-Galveston Subsidence District	Harris, Galveston
	Jimmie Schindewolf Nov 2005 – Present	North Harris County Regional Water Authority	Harris

Table 1-1

(continued)

Voting Membership (continued)			
Water Utilities	C. Harold Wallace March 1998 – Present	West Harris County WSC	Harris
	James Morrison March 1998 – Present	Walker County Rural WSC	Walker
	William Teer, P.E. March 1998 – Present	Retired	Leon

Non-Voting Membership	
Member	**Organization**
David Alders	East Texas Water Planning Group
Rick Gangluff	Lower Colorado Regional Water Planning Group
John Hoffmann	Region G Water Planning Group[1]
Danny Vance	Region C Water Planning Group[1]
Jennifer Bailey	Texas Dept of Agriculture
Temple McKinnon	Texas Water Development Board
Scott Hall	Lower Neches Valley Authority
Rebecca Hensley	Texas Parks & Wildlife Dept
Larry Jacobs	Montgomery County Soil & Water Cons Dist
Wayne Ahrens	West Harris County Regional Water Authority
Melinda Silva	North Fort Bend Water Authority

[1] also a voting member

1.2.1 Governmental Authorities in Region H

While municipal and county governments are the primary governmental entities, there are three regional councils of government represented in the region. The Houston-Galveston Area Council of Governments represents thirteen counties in the central and eastern part of the planning area: Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Wharton, Walker and Waller Counties. The Brazos Valley Council of Governments includes Leon and Madison counties, the two northwestern counties of the region. The Deep East Texas Council of Governments represents Trinity, Polk and San Jacinto counties located in the northeastern part of Region H.

In addition to these regional councils there are several other entities with regulatory or management authority of importance to long range water planning for the region. The State exercises certain responsibilities over water planning, supply and quality through the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), and Texas Department of Parks and Wildlife (TPWD). Points of contact for these state agencies are listed in *Table 1-2*. Three river authorities manage surface water supply in the region's three river basins: the Brazos River Authority, the San Jacinto River Authority and the Trinity River Authority. There are eleven soil and water conservation districts within Region H. Five groundwater conservation districts (GCD) in Region H have the authority to regulate groundwater withdrawals. The Harris-Galveston Subsidence District and the Fort Bend Subsidence District have existed for some time. Three new districts were formed in 2001: the Lone Star GCD in Montgomery County, the Bluebonnet GCD, which includes Austin, Grimes and Walker Counties, and the Mid-East Texas GCD which includes Leon, Madison and Freestone Counties. In November 2005, the Brazoria County Groundwater Conservation District was confirmed by voters in Brazoria County,

Two Regional Water Authorities existed in the 2006 Region H Water Plan: the North Harris County Regional Water Authority and the West Harris County Regional Water Authority. Since 2006 two new Regional Water Authorities have been formed: the Central Harris County Regional Water Authority and the North Fort Bend Water Authority. Municipalities have joined informally to study regional water supply facilities in Mid-Brazoria County.

Table 1-2

State Agencies with Oversight of Water Planning

Texas Water Development Board
J. Kevin Ward Executive Administrator PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231 (512) 463-7847
Carolyn Brittin Deputy Executive Administrator, Office of Planning PO Box 13231, 1700 N. Congress Ave., Austin, TX 78711-3231 (512) 475-0933
Texas Commission on Environmental Quality (plan review)
Mark R. Vickery Executive Director 12500 Park 35 Circle, Austin, TX 78753 (512) 239-3900
Texas Parks and Wildlife Department (plan review)
Carter Smith Executive Director 4200 Smith School Road, Austin, TX 78744-3291 (512) 389-4800

1.2.2 General Economic Conditions

Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The Port of Houston handled 225 million tons in 2007, adding approximately $118 Billion to the state economy. In 2008, the Houston area employed 2.6 million people. Region H is generally characterized with urbanized land uses and broad-based economic development. In areas outside of the urban core, agriculture dominates economic activities. The region supports six primary economic sectors: services, manufacturing, transportation, government, agriculture and fishing.

The service sector employs the greatest number of people in Region H. The most common service industries include: accounting, law, banking, computer software, engineering, healthcare and telecommunications. Medical specialties are concentrated at the Texas Medical Center in Houston and the University of Texas Medical Branch in Galveston. Tourism is also a major industry for both Galveston and Houston. Galveston alone drew more than 6.5 million tourists a year generating approximately $700 million dollars before hurricane Ike in September 2008.

The region's manufacturing industry is based on the historically important energy industries. Petroleum refining and chemical production are the largest two industries in the region. Technology and biotechnology firms have contributed to the diversification of the region's economic base. Petro-chemical, chemical and pulp and paper industries are major employers outside of the urban core of the region.

The transportation industry includes the Port of Houston and the Houston Ship Channel, the second largest port in the nation. A well-developed highway system and rail connections support this activity. The Gulf Intracoastal Waterway connects the ports of Freeport, Galveston, Houston and Texas City.

Government sector jobs are disbursed throughout the region, with the Texas Department of Corrections a major employer at prisons located in the region. The Johnson Space Center has program management responsibility for the International Space Station, ensuring continued economic importance into the next decade. There are numerous colleges in the region, and local school districts continue to grow and expand as population increases.

The agricultural industry, while providing limited numbers of jobs, contributes significantly to the region's economy. Major agricultural crops in the region include rice, soybeans, vegetables and hay. Cattle are the principal livestock, followed by horses and hogs.

Fishing, both commercial and sport, within Galveston Bay and other major bodies of surface water including Lake Conroe, Lake Houston and Lake Livingston are major contributors to the local economic base. One third of the state's commercial fishing income and one half of the state's expenditures for recreation fishing come from Galveston Bay. Oysters, shrimp and finfish are important commercial species in the bay.

1.3 Population and Water Demand in Region H

Based on the 2000 census, the population for Region H was approximately 4,848,948 in the year 2000. Approximately 65% (3,170,496) of this population resides in 98 cities and towns with populations of over 500 persons; 16 of these cities have populations in excess of 25,000. By 2006, the population for Region H had increased to 5,627,524 based on data from the Texas State Data Center as of July 1st, 2006. By 2010 the population in Region H is projected to increase to approximately 6,020,000.

Table 1-3 lists the cities with over 25,000 persons and their 2000 census population, 2006 reported population and associated reported municipal use in 2000 and 2006. The balance of the population resides in smaller communities or the unincorporated portions of the 15 counties of the region.

Table 1-3

Cities with Populations Over 25,000

City	2000 Census Population	2000 Reported Municipal Use (acre-feet/year)	2006 Population[1]	2006 Reported Municipal Use (acre-feet/year)
Baytown	66,430	10,938	70,943	9,866
Conroe	36,811	7,175	51,456	8,070
Deer Park	28,520	4,312	29,944	4,540
Friendswood	29,037	3,968	32,639	4,403
Galveston	57,247	16,228	57,951	-
Houston	1,953,631	347,947	2,112,671	346,393
Huntsville	35,078	5,108	36,999	6,075
La Porte	31,880	4,928	33,823	4,250
Lake Jackson	26,386	3,754	28,449	-
League City	45,444	6,617	63,087	8,491
Missouri City	52,913	10,239	73,748	-
Pasadena	141,674	18,567	152,037	17,716
Pearland	37,640	5,650	67,594	-
Sugar Land	63,328	15,677	84,622	14,883
Texas City	41,521	6,604	43,904	-
The Woodlands	55,649	13,714	-	-

Source: Texas Water Development Board
[1]*2006 Total Population Estimates for Texas counties as of July 1, 2006 from the Texas State Data Center.*

The 2000 and 2006 total county populations and reported 2000 and 2006 water use is listed in *Table 1-4*. Detailed information on local, county and regional population estimates and projections for the 50-year planning period are included in the *Chapter 2* of this plan. In 2006, municipal uses accounted for 48 percent of the region's total reported water use an increase from 41 percent in 2000. In addition to municipal water use, year 2000 estimates of other water use types were prepared by the TWDB for use in the planning process.

Table 1-4

County Population and Municipal Water Demand

County	2000 Census Population	2000 Reported Municipal Use (acre-feet/year)	2006 Population[1]	2006 Reported Municipal Use (acre-feet/year)
Austin	23,590	3,535	26,928	3,741
Brazoria	241,767	40,127	286,773	37,978
Chambers	26,031	3,908	32,383	3,240
Fort Bend	354,452	67,566	487,047	79,802
Galveston	250,158	44,544	282,126	42,931
Harris	3,400,578	598,596	3,830,130	598,977
Leon	15,335	1,880	16,218	2,079
Liberty	70,154	9,350	77,176	6,943
Madison	12,940	1,728	13,534	2,812
Montgomery	298,768	51,193	399,941	62,070
Polk[2]	33,098	4,489	37,295	4,682
San Jacinto	22,246	2,698	24,739	2,540
Trinity[2]	10,380	1,231	10,733	801
Walker	61,758	14,741	64,026	12,340
Waller	32,663	4,610	38,475	5,030
Region H Total	4,848,918	850,196	**5,627,524**	**865,966**

Source: Texas Water Development Board
[1]*2006 Total Population Estimates for Texas counties as of July 1, 2006 from the Texas State Data Center.*
[2] Includes portion of the county in the Region H area

Manufacturing uses accounted for 33 percent of the region’s total use in 2006, an increase from 30 percent in 2000. Irrigation uses represented 13 percent of the region's total 2006 reported use, a decline from the 22 percent reported in 2000. *Figure 1-2* illustrates the distribution of 2000 water demand by use type. Total water demands for each county are listed in *Table 1-5*.

Figure 1-2

Percentage of 2006 Total Water Demand by Use

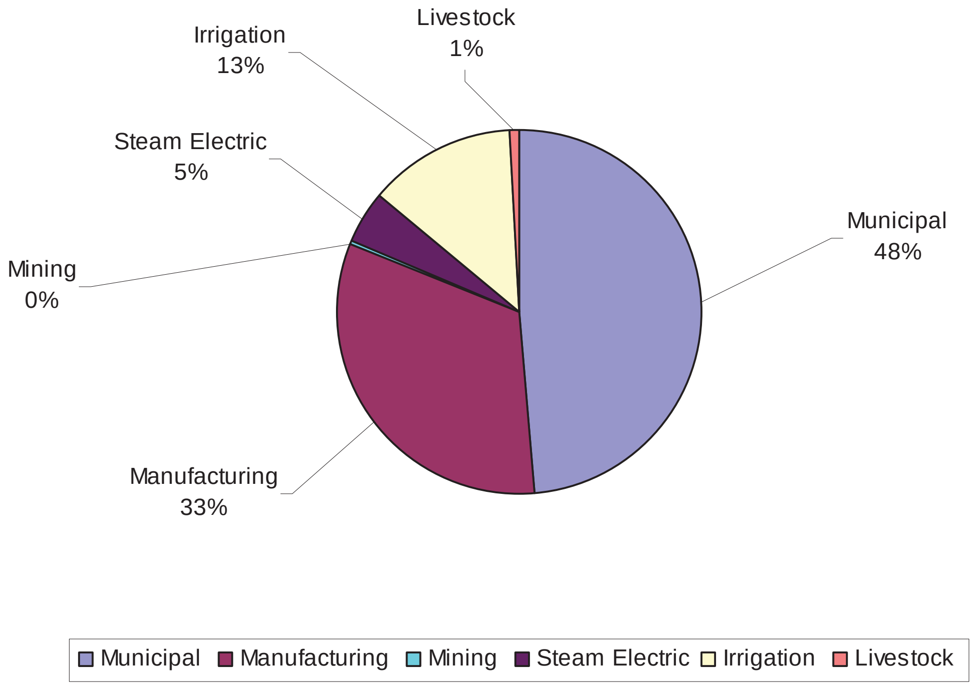


Table 1-5

Reported 2006 Non-municipal Water Use (acre-feet per year)

County	MFR	MIN	POW	IRR	STK	Total
Austin	76	0	0	3,101	1,618	4,795
Brazoria	220,027	374	0	84,820	1,553	306,774
Chambers	13,450	5,281	631	54,594	561	74,517
Fort Bend	4,378	2	70,987	28,703	1,087	105,157
Galveston	18,592	0	158	2,072	255	21,077
Harris	321,469	84	10,076	3,082	1,747	336,458
Leon	799	50	0	242	1,671	2,762
Liberty	384	0	0	40,404	911	41,699
Madison	227	0	0	15	1,112	1,354
Montgomery	1,449	4	729	536	457	3,175
Polk [2]	1	0	0	0	214	215
San Jacinto	11	0	0	0	433	444
Trinity [2]	0	0	0	500	296	796
Walker	63	0	0	400	740	1,203
Waller	27	86	0	17,889	1,253	19,255
Region H Total	**580,953**	**5,881**	**82,581**	**236,358**	**13,908**	**919,681**

Source: Texas Water Development Board
[2] Includes the portion of the county in Region H.
Categories: Manufacturing (MFR), Irrigation (IRR), Mining (MIN), Steam Electric Power (POW) and Livestock (STK)

1.3.1 Major Demand Centers

Major demand centers are locations of water uses that require a significant portion of the region's water supply. As would be expected, major urban areas with large populations and major industrial development are typically major demand centers. In Region H major demand centers are defined for municipal, manufacturing and irrigation uses as having a reported use, by use type, exceeding 25,000 acre-feet for counties and 10,000 acre-feet for cities.

Houston has the greatest overall water demand in the region, as was shown in *Table 1-6,* followed closely by remaining demands in Harris County. The next highest demands are Fort Bend, Montgomery, Galveston, and Brazoria Counties. Harris County and the City of Houston dominate municipal water use in Region H. The City of Houston used 346,393 acre-feet in the year 2006 or approximately 40 percent of the total regional municipal use. As shown in *Table 1-6*, Brazoria, Fort Bend, Galveston and Montgomery Counties are major demand centers with reported use in excess of 25,000 acre-feet in both 2000 and 2006. In addition to the City of Houston, municipalities identified as major demand centers (reported municipal demands in excess of 10,000 acre-feet) include the cities of Pasadena, Galveston, Baytown and Sugar Land.

Table 1-6

Major Municipal Demand Centers

County/City	2000 Municipal Use (acre-feet)	2006 Municipal Use (acre-feet)
City of Houston	347,947	346,393
Harris County (excluding Houston)	250,649	252,584
Fort Bend County	67,566	79,802
Galveston County	44,544	42,931
Montgomery County	51,193	62,070
Brazoria County	40,127	37,978
City of Pasadena	18,567	17,716
City of Galveston	16,228	-[1]
City of Baytown	10,938	9,866
City of Sugar Land	15,677	14,883

Source: Texas Water Development Board
[1] *Not Reported*

The largest manufacturing demand center is Harris County, which used 321,469 acre-feet of water in 2006 (55 percent of the regional total). Two other major demand centers are identified: Brazoria County, with reported 2006 manufacturing use of 220,027 acre-feet, and Galveston County with a reported 2006 manufacturing use of 18,592 acre-feet. The principal water using industries in the region are petroleum refining, chemical products and pulp and paper mills. The three largest manufacturing demand centers are shown in *Table 1-7*.

Table 1-7

Major Manufacturing Demand Centers

County	2000 Manufacturing Use (acre-feet per year)	2006 Manufacturing Use (acre-feet per year)
Brazoria	221,930	220,027
Galveston	35,381	18,592
Harris	349,420	321,469

Source: Texas Water Development Board

The four largest irrigation demand centers are Brazoria, Chambers, Liberty and Fort Bend counties. *Table 1-8* highlights each county's reported 2000 and 2006 irrigation use. The major irrigated crops in the region are rice, soybeans, vegetables and cotton.

Table 1-8

Major Irrigation Demand Centers

County	2000 Irrigation Use (acre-feet per year)	2006 Irrigation Use (acre-feet per year)
Brazoria	149,188	84,820
Chambers	117,777	54,594
Fort Bend	53,455	28,703
Liberty	82,901	40,404

Source: Texas Water Development Board

Livestock and mining water use represent smaller demands in the Region H area. Mining water demands in Region H are associated primarily with oil and gas production.

1.3.2 Water User Group (WUG) Updates

The 2011 Region H Water Plan was updated to include additional Water User Groups (WUGs) based on changes in population estimates. Water User Groups (WUGs) are added when their population increases to 500 or more residents. Three new cities were added to the WUG list based on population estimates for the year 2010. Two recently created regional water authorities-the Central Harris County Regional Water Authority (CHCRWA) and the North Fort Bend Water Authority (NFBWA)-were also added. Descriptions of the new WUGs are presented below.

Kendleton

Kendleton is located in southern Fort Bend County. The 2000 census reported 466 residents in the City of Kendleton; however, the current population according to the Census Bureau is 525. According to the United States Census Bureau, the city has a total land area of 1.1 square miles.

Montgomery

Montgomery is located at the junction of Texas 105 and FM 149, near the southwestern edge of Sam Houston National Forest in western Montgomery County. Its population is approximately 576 residents. According to the United States Census Bureau, the city has a total area of 4.6 square miles which includes 4.5 square miles of land and 0.1 square miles of water.

Stagecoach

Stagecoach is a town in southwestern Montgomery County. The last recorded population for Stagecoach was 507 residents in 2007. According to the United States Census Bureau the city has a total land area of 1.14 square miles and a water area of 0.05 square miles.

Central Harris County Regional Water Authority

The Central Harris County Regional Water Authority (CHCRWA) was created in June 2005 and is comprised of 11 Municipal Utility Districts (MUDs) primarily located north of the City of Houston, east of SH 249, south of FM 1960 and west of I-45.

The CHCRWA absorbed the following WUGs that were stand alone entities in the 2006 Plan: Fallbrook UD, Harris County MUD #150, Harris County MUD #200, Harris County MUD #300 and a portion of the demand in County-Other.

North Fort Bend Water Authority

The North Fort Bend Water Authority (NFBWA) was created by the 79th Texas Legislature in May, 2005.

The NFBWA absorbed the following WUGs that were stand alone entities in the 2006 Plan: Big Oaks MUD, Cinco MUD #2, Cinco MUD #6, Cinco MUD #7, Cinco MUD #8, Cinco MUD #9, Cornerstones MUD, Fort Bend County MUD #2, Fort Bend County MUD #30, Fort Bend County MUD #37, Fort Bend County MUD #41, Grand Lakes MUD #4, Kingsbridge MUD, North Mission Glen MUD and a portion of the demand in County-Other.

1.4 Region H Water Supply Sources and Providers

Groundwater, surface water captured in reservoirs and run-of-river sources comprise the majority of the water supply within Region H. Reused and recycled water and saline sources are additional supply sources utilized in Region H.

1.4.1 Groundwater Sources

Two major aquifers supply groundwater within the Region H area. The aquifer that furnishes the most groundwater within the area is the Gulf Coast aquifer. This aquifer is composed of the Evangeline, Chicot and Jasper formations and extends from near the gulf coast shoreline to approximately 100 to 120 miles inland, to Walker and Trinity counties. The other major aquifer in the study area is the Carrizo-Wilcox, which begins 115 to 125 miles inland and extends beyond the northern boundary of the region. There are also four minor aquifers in this part of the state: the Sparta and Queen City aquifers occur in Leon County, the southern part of Madison County and northern parts of Walker and Trinity Counties. In Leon and Madison Counties, they lie above the Carrizo-Wilcox Aquifer. The Yegua Formation and the Jackson Group comprise the Yegua-Jackson aquifer, located in parts of Madison, Walker, Trinity and Polk Counties. The Brazos River alluvium occurs along the main stem of the Brazos as it passes through the region, except in Brazoria County. *Figure 1-3* and *Figure 1-4* illustrate these groundwater sources. Groundwater use is regulated in Harris, Galveston and Fort Bend Counties due to the potential for over-drafting of the Gulf Coast Aquifer. Groundwater Management Plans have been published for Austin, Leon, Madison Montgomery and Walker Counties. The active Groundwater Conservation and Subsidence Districts within Region H are shown on *Figure 1-5.* Groundwater withdrawals accounted for approximately 34 percent of the total regional water supply in 2000 and approximately 30 percent in 2004.

1.4.2 Surface Water Sources

Surface water sources in Region H are reservoir storage and run-of-river supply for the three rivers in the area: the Trinity, the San Jacinto and the Brazos. There are no major springs located within Region H, although small springs and seeps supply base flows for some streams. Historically there were numerous small seeps identified throughout the region. Many of these have ceased flowing due to land use changes and groundwater pumping. The most significant spring was Cold Springs in San Jacinto County, above the town of Coldspring, with recorded flows of 32 gpm (50 ac-ft/yr) as late as the 1960's.

The following discussion of each basin's surface water supply is based upon information in *Water for Texa*s (1997 and 2002). Water availability estimates come from the TCEQ Water Availability Models (WAMs). *Figure 1-6* illustrates the region's surface water sources. A selected bibliography of related references is included in *Appendix 1A*.

Figure 1-3

Region H Major Groundwater Sources

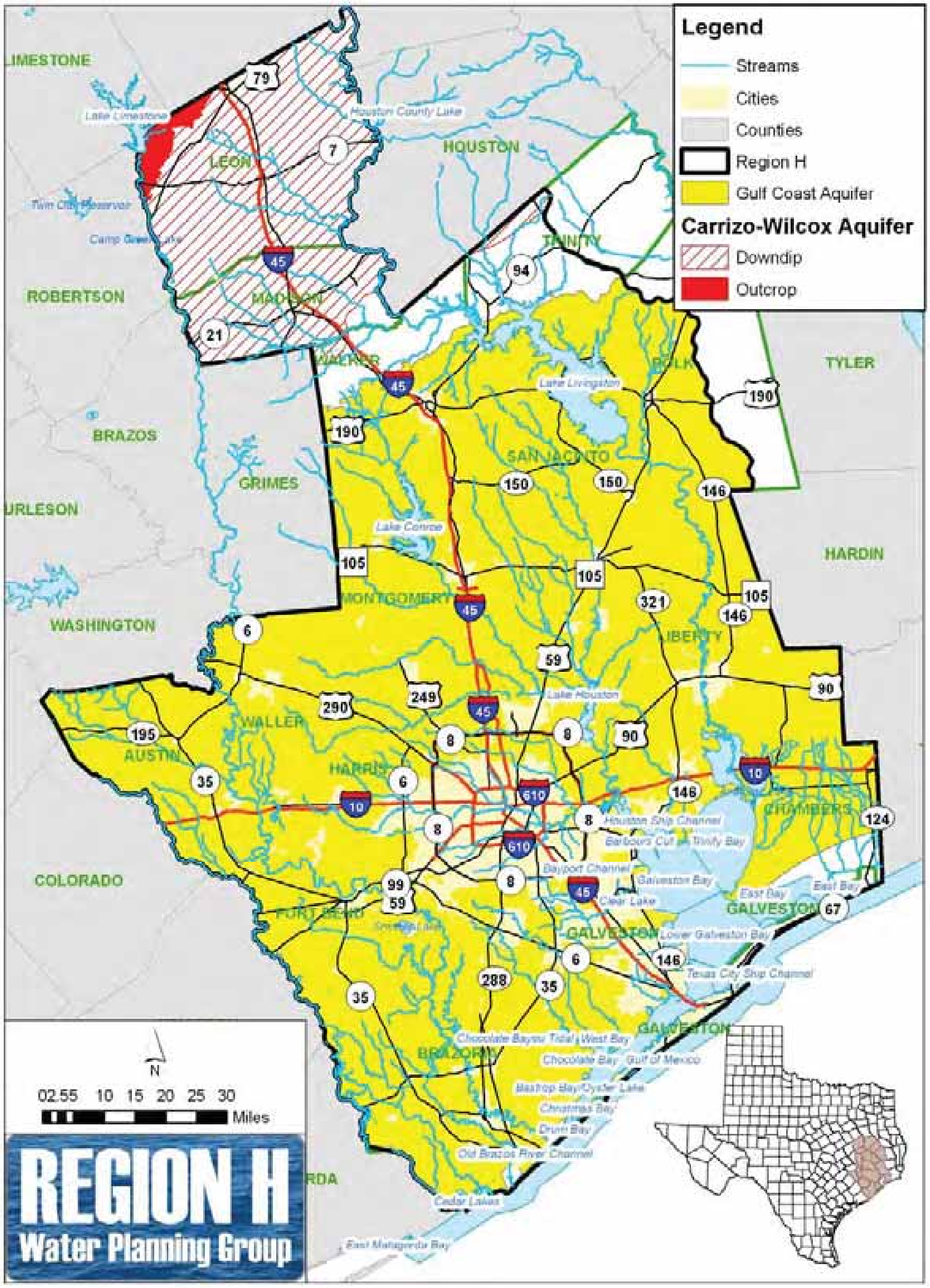


Figure 1-4

Region H Minor Groundwater Sources

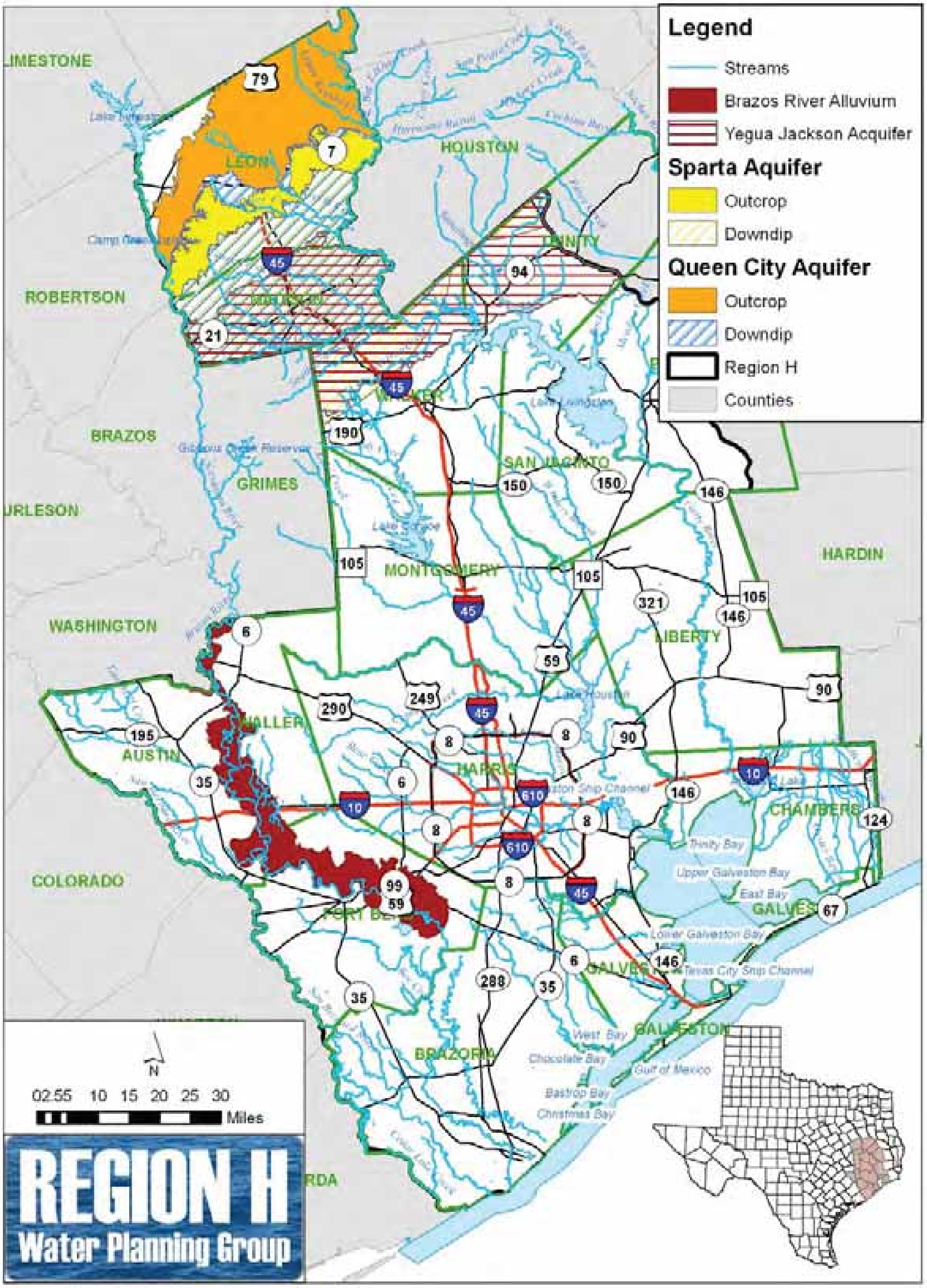


Figure 1-5

Region H Groundwater Conservation and Subsidence Districts

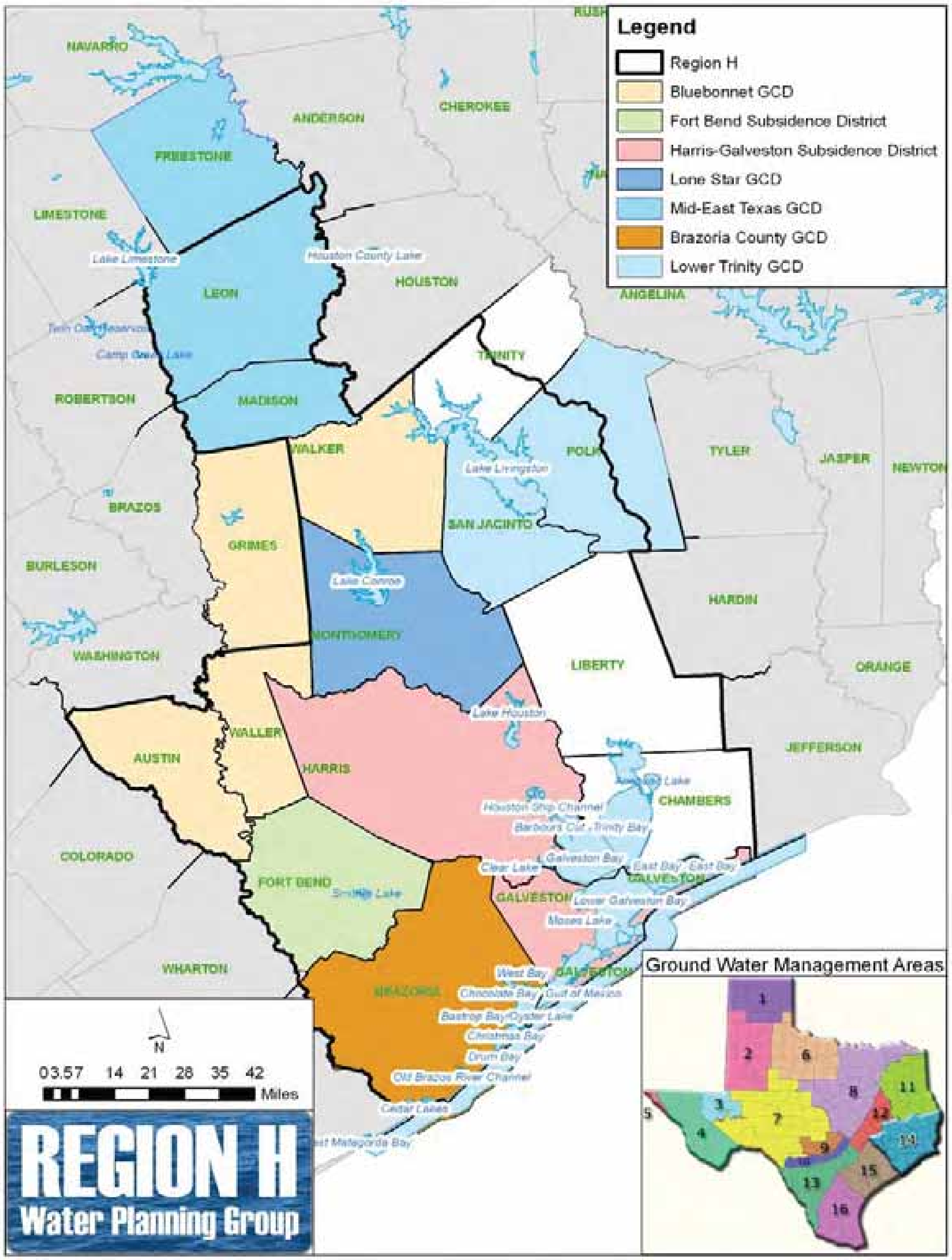
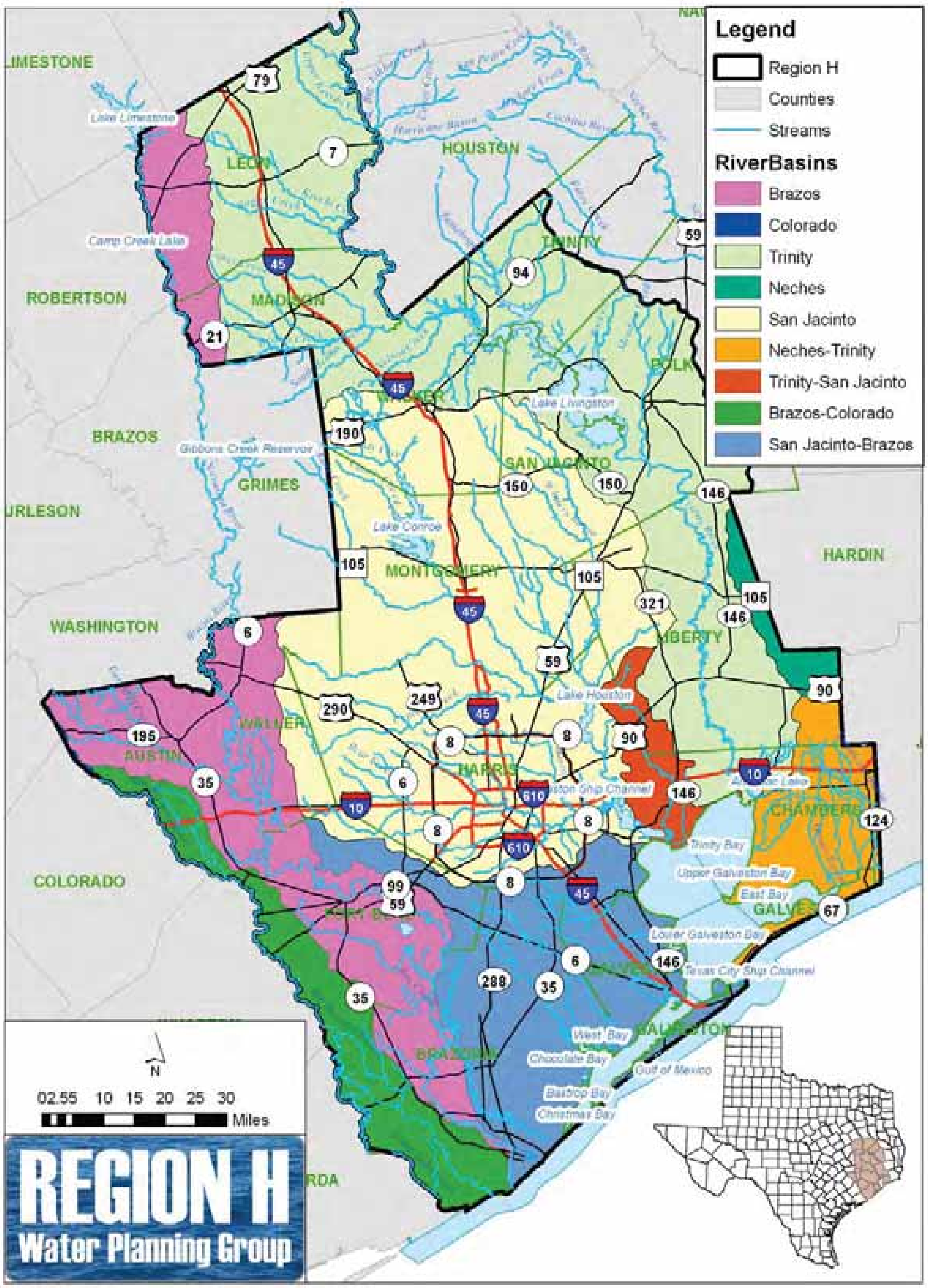


Figure 1-6

Region H Surface Water Sources



1.4.3 Trinity River Basin

The Trinity River basin contains two water projects in Region H: Lake Livingston and the Wallisville Salt Water Barrier. The City of Houston and the Trinity River Authority (TRA) sponsored Lake Livingston's construction. It is operated by the TRA to meet the service demands of the City of Houston and other local users in the Trinity Basin and in the Neches-Trinity Coastal Basin. The U.S. Army Corps of Engineers recently completed the Wallisville Saltwater Barrier. These two projects are operated as a system, using Livingston primarily to store water and Wallisville to control the migration of salt water from Trinity Bay. Lake Livingston and Wallisville permitted yields are 1,255,500 acre-feet/year and 89,700 acre-feet/year respectively. The sum of these permitted yields is the combined yield of the system (1,345,200 acre-feet per year). Additional permitted run-of-the-river water supplies downstream of Lake Livingston total 220,230 acre-feet per year. These supplies are associated with the water rights agreements established at the time of Lake Livingston permitting.

1.4.4 San Jacinto River Basin

The San Jacinto River Basin has two major public water supply reservoirs: Lake Houston and Lake Conroe. Lake Houston, with a permitted yield of 168,000 acre-feet/year, is owned and operated by the City of Houston for use in its service area. The City of Houston and San Jacinto River Authority (SJRA) jointly own Lake Conroe, with the COH holding two-thirds of the permitted rights (66,667 acre-feet/year) and SJRA holding one-third (33,333 acre-feet/year). SJRA manages Lake Conroe, providing supply to Montgomery and Harris County. The SJRA has an additional run-of-river water right of 55,000 acre-feet per year and an indirect reuse water right of 14,944 acre-ft per year that is physically diverted out of Lake Houston.

1.4.5 Brazos River Basin

The Brazos River Authority (BRA) manages the water supply resources from 11 reservoirs within this basin. Several of these reservoirs are operated by BRA as a System Operation where commitments made to downstream demands can be met from any upstream reservoir using storage available in the system. The U.S. Army COE owns eight of these reservoirs, the City of Lubbock owns one reservoir and BRA owns three reservoirs within the basin. In addition to the BRA water supply reservoirs, there are several other reservoirs in the basin. While none of these reservoirs are located within the Region H area, supply from the system is committed in Region H.

The total Brazos Basin supply, including firm supplies from BRA's reservoirs and reliable yield from run-of-river permits in both Region G and H, is estimated at over 1,200,000 acre-feet per year. The estimated firm yield from BRA's reservoirs is about 650,000 acre-feet per year. Over 500,000 acre-feet per year of the BRA firm supply is committed under contracts to various entities upstream of Region H. Approximately 155,030 acre-feet per year of firm supply is contracted for use in the Region H area. The reliable yield of run-of-river permits granted in Region H is estimated at approximately 418,311 acre-feet per year. Suppliers in the Brazos Basin include Dow Chemical and the Richmond Irrigation Company with permitted diversions of 321,856 and 40,000 acre-feet per year respectively. Each of these entities diverts surface water from the Brazos River and enhances the reliability of their supplies through off-channel surface reservoirs as well as contracts with BRA for upstream supplies.

1.4.6 San Jacinto - Brazos Coastal Basin

There are several significant water users within the San Jacinto-Brazos Coastal Basin supported by the run-of-river water supplies from the Brazos Basin. Suppliers include the Gulf Coast Water Authority which has historically owned two water rights on the Brazos River with permitted diversions of 125,000 and 99,932 acre-feet per year. The GCWA recently purchased former Chocolate Bayou Water Company water rights with permitted diversions of 155,000 and 57,500 acre-feet per year. The estimated reliable yield of all GCWA rights is 229,786 acre-feet per year. The GCWA also enhances the reliability of their surface water supplies through the use of off-channel surface reservoirs as well as contracts with BRA for upstream supplies.

1.4.7 Use by Source

TWDB reports that Region H used 2,087,514 acre-feet of water in 2000. Of that, 709,990 acre-feet (34%) came from groundwater wells, and 1,377,524 acre-feet (66%) came from rivers and other surface sources. Similarly, the most recent water use estimates of groundwater and surface water use available from the TWDB show that in 2004, groundwater use declined to under 600,000 acre-feet, approximately 30% of the water used in Region H. Surface water use increased to approximately 1,420,000 acre-feet, approximately 70% of the total Region H water use. The three counties with the largest decline in groundwater use were Brazoria, Fort Bend, and Liberty Counties.

Industrial water users (principally chemical industry users) in the region used approximately 1,000,000 acre-feet of saline (sea) water in the year 2000 and the petroleum industry reported the reuse of just over 3,000 acre-feet of treated effluent. *Table 1-9* summarizes the groundwater and surface water usage for each county. *Table 1-10* lists the estimated year 2060 reliable yields available from existing sources to Region H. Further information regarding the yield of major surface water rights in Region H is available in *Chapter 3 – Analysis of Current Water Supplies*.

Table 1-9

County Water Use by Source

County	2000 Groundwater (acre-feet)	2000 Surface Water (acre-feet)	2000 Total Use (acre-feet)	2004 Groundwater (acre-feet)	2004 Surface Water (acre-feet)	2004 Total Use (acre-feet)
Austin	15,928	48	15,976	11,156	1,492	12,648
Brazoria	50,397	365,792	416,189	20,761	357,074	377,835
Chambers	23,005	145,255	168,260	8,085	135,990	144,075
Fort Bend	122,416	70,494	192,910	76,107	76,953	153,060
Galveston	5,001	91,875	96,876	5,880	85,553	91,433
Harris	336,044	637,022	973,066	358,684	673,520	1,032,204
Leon	6,398	0	6,398	4,385	2,443	6,828
Liberty	40,199	61,761	101,960	13,786	69,480	83,266
Madison	2,725	0	2,725	2,611	705	3,316
Montgomery	55,701	576	56,277	54,865	952	55,817
Polk[1]	2,906	1,741	4,647	4,969	2,315	7,284
San Jacinto	3,057	667	3,724	1,955	1,379	3,334
Trinity[1]	1,601	316	1,917	1,000	1,348	2,348
Walker	16,259	1,655	17,914	4,157	10,459	14,616
Waller	28,353	322	28,675	29,551	1,009	30,560
Total	709,990	1,377,524	2,087,514	597,952	1,420,672	2,018,624

Source: TWDB Annual Survey of Ground and Surface Water Use
[1] Includes only the portion of the county in the Region H area

Table 1-10

Projected 2060 Supplies Available for Use in Region H

Groundwater	**Projected Yield (acre-feet/year)**
Gulf Coast Aquifer	685,843
Carrizo-Wilcox Aquifer	9,610
Queen City Aquifer	7,906
Sparta Aquifer	17,414
Brazos River Alluvium	41,539
Yegua-Jackson Aquifer	6,400
Undifferentiated Aquifer	1,117
Subtotal	**769,829**
Basin/Reservoir/Run-of-River	
Neches Basin	
Sam Rayburn Contract[1]	64,177
Neches-Trinity Coastal Basin	
Run-of-River	21,754
Trinity Basin	
Lake Livingston/Wallisville	1,344,000
Run-of-River, Lower Basin	224,530
Trinity-San Jacinto Coastal Basin	
Run-of-River	34,313
San Jacinto Basin	
Lake Houston	173,000
Lake Conroe	74,300
Run-of-River	55,000
San Jacinto-Brazos Coastal Basin	
Run-of-River	33,051
Brazos River Basin	
Brazos River Authority System[2]	155,031
Run-of-River, Lower Basin	418,311
Brazos-Colorado Coastal Basin	
Run-of-River	12,019
Local Supplies (i.e., stock ponds) all basins	31,895
Subtotal	**2,641,381**
Total	**3,411,210**

[1] Values based on long-term contracts from LNVA to Region H customers
[2] Values based on long-term contracts from BRA to Region H customers

1.4.8 Major Water Providers

A major water provider is an entity that delivers and sells a significant amount of raw or treated water for municipal and/or manufacturing use on a wholesale and/or retail basis. Generally, major providers serve as a primary water sources for a significant portion of the region's municipal or industrial water users and are those entities likely to develop future major water supply projects. As in the rest of the state, Region H has relatively few entities that hold the rights to significant amounts of water, particularly surface water, and provide retail or wholesale water supplies to a significant number of area users.

Five entities in Region H own over 100,000 acre-feet per year of municipal and/or industrial water rights. Their total holdings represent approximately 62 percent of the region's municipal and industrial water rights. The Chambers-Liberty Counties Navigation District (CLCND) has rights of over 100,000 acre-feet per year, but its supplies are currently used primarily for irrigation. Additionally, portions of these supplies are not 100 percent reliable. Reliability is based on modeling diversions under drought of record conditions. Irrigation rights can be issued for supplies that are available on an interruptible basis, i.e. 75-percent of the time. These entities are listed in *Table 1-11* along with other substantial water rights holders.

Table 1-11

Major Region H Water Rights

Provider	Permitted Amount (acre-feet per year)
City of Houston	1,234,567
Gulf Coast Water Authority[1]	449,432
Trinity River Authority [2]	403,200
San Jacinto River Authority	203,377
Brazos River Authority [2]	155,030
Brazosport Water Authority	45,000
Chamber-Liberty County Navigation Dist.	112,947

[1] Includes water right permits purchased from the former Chocolate Bayou Water Co.
[2] Portion currently contracted in Region H only
Source: TCEQ Master Water Rights Database

Four industries hold large manufacturing use water rights to provide for plant operations. These entities, listed in *Table 1-12*, generally do not act as providers to other industrial customers. Dow Chemical, however, provides municipal water supply to the Brazosport Water Authority.

Table 1-12

Large Industrial Water Rights Holders

Industrial Water Rights Holder	Fresh Water Permits (acre-feet per year)
Dow Chemical Company	321,856
Reliant Energy / Texas Genco	166,238
Occidental Chemical Corporation	140,000
Phillips Petroleum Company	39,880

Over 2,300 public water suppliers deliver water to communities and businesses in Region H. A review of these suppliers indicates that 70 percent serve fewer than 500 customers. Of the over 700 municipal providers serving 500 or more customers, over 270 are addressed in this plan as part of collective reporting units. The North Harris County Regional Water Authority accounts for 152 Utility Districts (the two cities in the Authority, Tomball and Jersey Village, are listed separately in the plan). The West Harris County Regional Water Authority accounts for 107 Utility Districts, with its member city (Katy) similarly listed separately. The Central Harris County Regional Water Authority accounts for 11 Municipal Utility Districts. The North Fort Bend Water Authority includes the City of Fulshear, which is listed separately in the plan. A final collective unit in the plan is The Woodlands, a planned community in Montgomery County served by a series of related utility districts.

1.5 Water Quality and Natural Resources

1.5.1 Water Quality

The Texas Commission on Environmental Quality (TCEQ) *2008 Water Quality Inventory* was prepared in compliance with *Sections 305(b)* and *303(d)* of the Federal Clean Water Act. *Figure 1-*7 illustrates the impaired stream segments within Region H identified by TCEQ in 2008. The figure was prepared using the 2008 impaired segments GIS data available on the TCEQ website. In addition to water quality data collected by TCEQ, agencies participating in the Texas Clean Rivers Program (CRP) annually compile and publish Regional Water Quality Assessments. In Region H, the Brazos, San Jacinto and Trinity River Authorities participate in the Texas Clean Rivers Program and have each published reports on the water quality conditions within their respective basins. These reports established the condition of each river and stream segment and identified those segments with water quality concerns for a number of parameters.

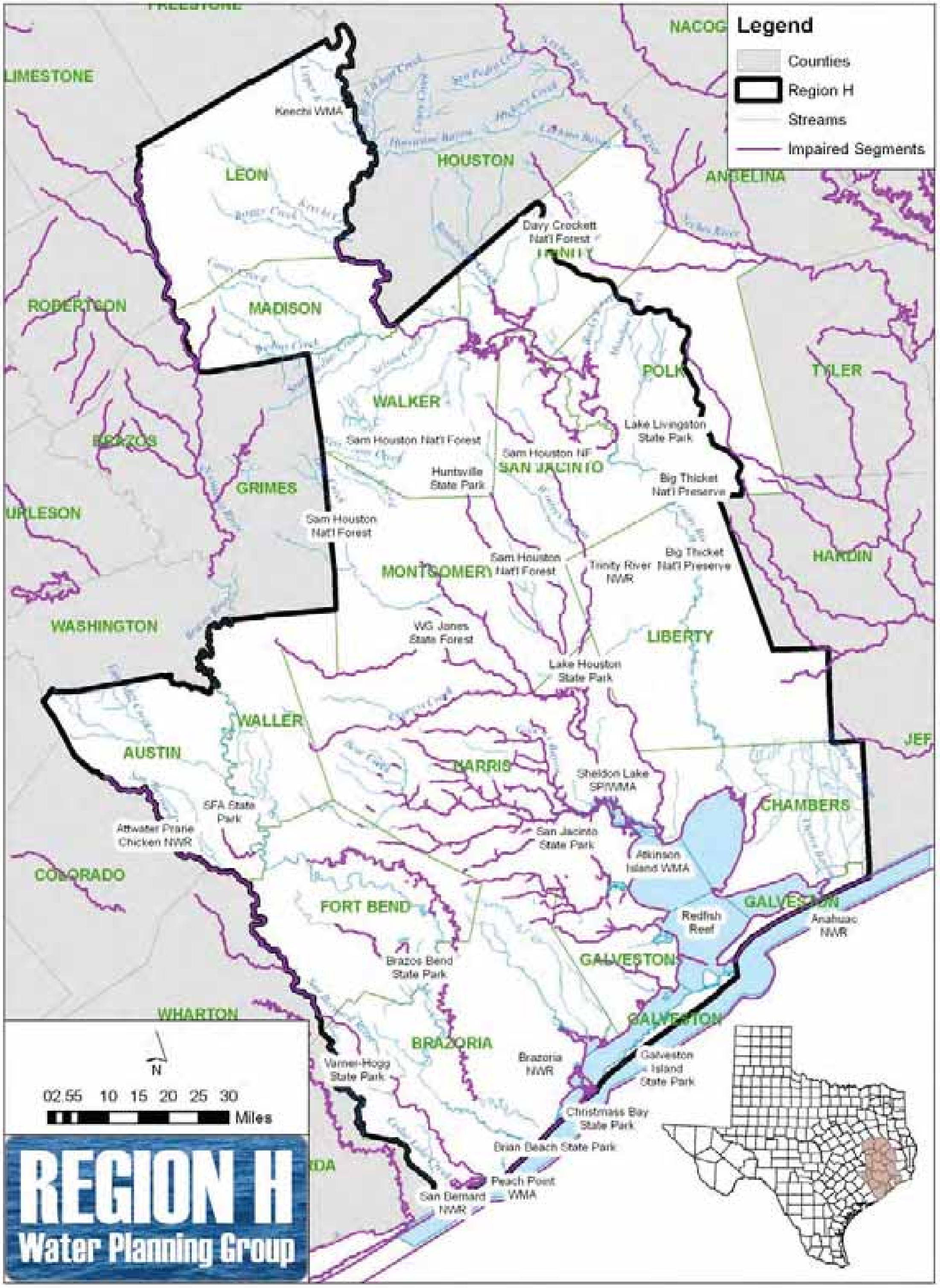
Groundwater within the region is generally of good quality, with total dissolved solids below 1,000 mg/l. Iron is a concern in some portions of the Carrizo-Wilcox Aquifer, and calcium, magnesium and sulfate cause high total hardness in portions of the Brazos River Alluvium. Some groundwater supplies contain arsenic and radon. The current maximum contaminant level (MCL) for arsenic in water used for public supply is 0.01 mg/l set by the Environmental Protection Agency (EPA) in January of 2006. Currently, most groundwater produced within Region H has an arsenic content below the existing MCL. There is a limited area within the northwest part of Harris County where the concentration of arsenic in some sands of the Gulf Coast aquifer exceeds 0.01 mg/l. Wells are now constructed to not screen these sands. In some instances, consideration is being given to treating the water from older wells to lower the arsenic content below 0.01 mg/l. Shallow aquifer contamination has been reported from refinery spills along the Houston ship channel that affects groundwater quality and may affect surface water quality in Galveston Bay.

Radon is not a regulated constituent as a MCL has not been established for it. There are some areas in the west part of Harris County where isolated sands can contain water with higher concentrations of radon. Through geophysical logging to identify these depth intervals and by the use of well construction techniques that isolate the sands, production wells produce water with low levels of radon.

Surface water throughout Region H is of sufficient water quality to be treated for municipal use using conventional measures. Contact recreation use is limited in the lower Trinity River due to fecal coliform bacteria levels. Growth in the San Jacinto River Basin has increased nutrient loading and fecal coliform levels in many streams, particularly Buffalo Bayou. Sand mining, in particular, has lead to increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels. Likewise, nutrients, dissolved minerals and elevated fecal coliform levels have been identified in the Lower Brazos River. Also of concern in the lower Brazos River are seasonal low flows, which allow the tidal salt-wedge to reach municipal and industrial freshwater intakes in Freeport.

Figure 1-7

Region H Surface Water Quality



1.5.2 Topography

Region H is located in the Gulf Coastal Plains of Texas. It is primarily made up of two vegetational areas: the Gulf Prairies and the Piney Woods.

The Gulf Prairies make up the majority of the region. They hold marsh and saltwater grasses in tidal areas, and bluestems and tall grasses inland. Oaks, elms and other hardwoods grow in limited amounts. The natural grasses make the region ideal for cattle grazing and the fertile soils support rice, cotton, wheat and hay farming. Wildlife in the area includes alligator, river otter, eastern brown pelican, Eskimo curlew, piping plover and whooping crane. Counties in the Gulf Prairie include Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris and Waller.

The Piney Woods encompass the northeastern portion of Region H, consisting of pine forests interspersed with native and improved grasslands. Longleaf, shortleaf and loblolly pine are the dominant native species harvested, but slash pine and various hardwood species are cultivated as well. Timber production and cattle are the principal agricultural products in that portion of the region. Wildlife in the area includes bobcat, ringtail, river otter, red-cockaded woodpecker and bald eagle. Counties in the Piney Woods include Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity and Walker.

1.5.3 Public Lands

The Region contains 325,394 acres of state and national forests, supporting hiking, camping, picnicking and horseback riding. It also contains 107,138 acres of coastal wildlife refuges for migratory waterfowl, as well as native waterfowl and plant species. It contains a portion of the Big Thicket National Preserve, designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as part of the International Biosphere Reserve. Finally, the region holds 12,170 acres of Texas Wildlife Management Areas, preserved for bird watching in coastal areas and seasonal hunting inland. The area names and locations are presented in *Table 1-13*, and a location map is provided at *Figure 1-8*.

Table 1-13

Public Lands

Resource Area	Acreage	County
State and National Forests		
W. Goodrich Jones State Forest	1,725	Montgomery
Davey Crockett National Forest	162,012[1]	Total
	67,329	Trinity
Sam Houston National Forest	161,657	Total
	47,777	Montgomery
	60,247	San Jacinto
	53,633	Walker
State and National Preserve		
Big Thicket National Preserve	86,000	Total
National Wildlife Refuges		
Anahuac NWR	30,000	Chambers
Brazoria NWR	42,338	Brazoria
San Bernard NWR	28,000	Brazoria
Trinity River NWR	6,800	Liberty
Texas Wildlife Management Areas		
Candy Cain Abshier WMA	207	Chambers

Atkinson Island WMA	151	Harris
Keechi Creek	1,500	Leon
Peach Point	10,312	Brazoria

Source: Texas Almanac, Texas Parks & Wildlife Department
[1] *Total includes portion of Davey Crockett National Forest located in counties outside of Region H*

1.5.4 Navigation

Navigation within Region H rivers is generally limited to the lower reaches of the main stems of the Brazos, San Jacinto, and Trinity Rivers including the Houston Ship Channel and Turning Basin. In addition the Gulf Intracoastal Waterway, an inland canal system that connects ports in the Gulf of Mexico, traverses the Region H coastline through the ports of Galveston and Freeport. There is significant use of rivers, streams and reservoirs throughout the region by recreational boaters and fishermen. There are no navigation water permits in the Region H area.

1.5.5 Threats to Agricultural and Natural Resources

The Regional Water Planning Guidelines (31 TAC 357) require planning groups to “identify threats to agricultural and natural resources of the state due to water quantity problems or water quality problems related to water supply.”

There are no water quantity problems for agriculture in Region H. However, it is common practice in the region for irrigators to procure groundwater permits and surface water supplies on a year-to-year basis. The absence of long-term contracts prevents the full representation of irrigation supply as “allocated” in the regional plan. As a result, irrigation is often represented as having a shortage met through water management strategies. The current plan meets all projected irrigation demands. Increased water costs, coupled with decreasing prices for rice and other irrigated crops, may cause agricultural water demand to decline in the future.

Galveston Bay estuary is the most significant natural resource in Region H. The estuary is dependent upon freshwater inflows to maintain seasonal salinity ranges for wildlife habitat and fisheries productivity. The estuary is capable of withstanding natural flood and drought cycles, but the amplified effects of water diversions during a drought may pose a threat to this resource. Target inflow amounts and frequencies for Galveston Bay are discussed in *Chapter 3* and inflows with and without water management strategies are analyzed in *Chapter 4*.

Other natural resources within the region also require minimum in-stream flows. As with Galveston Bay, peak diversions during drought periods may reduce flows to the point that detrimental effects are felt by the environment. Texas is currently developing policies and procedures to determine and protect the required minimum flows in streams and estuaries of the State. In 2007, Senate Bill 3 took effect beginning the environmental flows allocation process. The process began with the creation of the Environmental Flows Advisory Group and the Texas Environmental Flows Science Advisory Committee to guide the statewide process. Two basin and bay area stakeholder groups have been formed to develop recommendations concerning environmental flow regimes, associated policy considerations, and strategies to meet the flow recommendations that will impact environmental flows in Region H. The Trinity and San Jacinto Rivers and Galveston Bay Stakeholders Committee was appointed in July of 2008. The TCEQ is expected to adopt environmental flow standards for the Trinity and San Jacinto Rivers/Galveston Bay by June 1, 2011. The Stakeholder group for the Brazos River/Bay and Estuary Area will be appointed by June 1, 2010 and begin working on recommendations concerning environmental flow regime, associated policy considerations, and strategies to meet the flow recommendations. The TCEQ is expected to approve the group’s recommended environmental flow standards by April 1, 2013.

The number of additional threatened and endangered species added to each county by the Texas Department of Parks and Wildlife since the adoption of the 2006 Region H Water Plan is presented in *Table 1-14*. Threatened and endangered species are further discussed in *Chapter 7*.

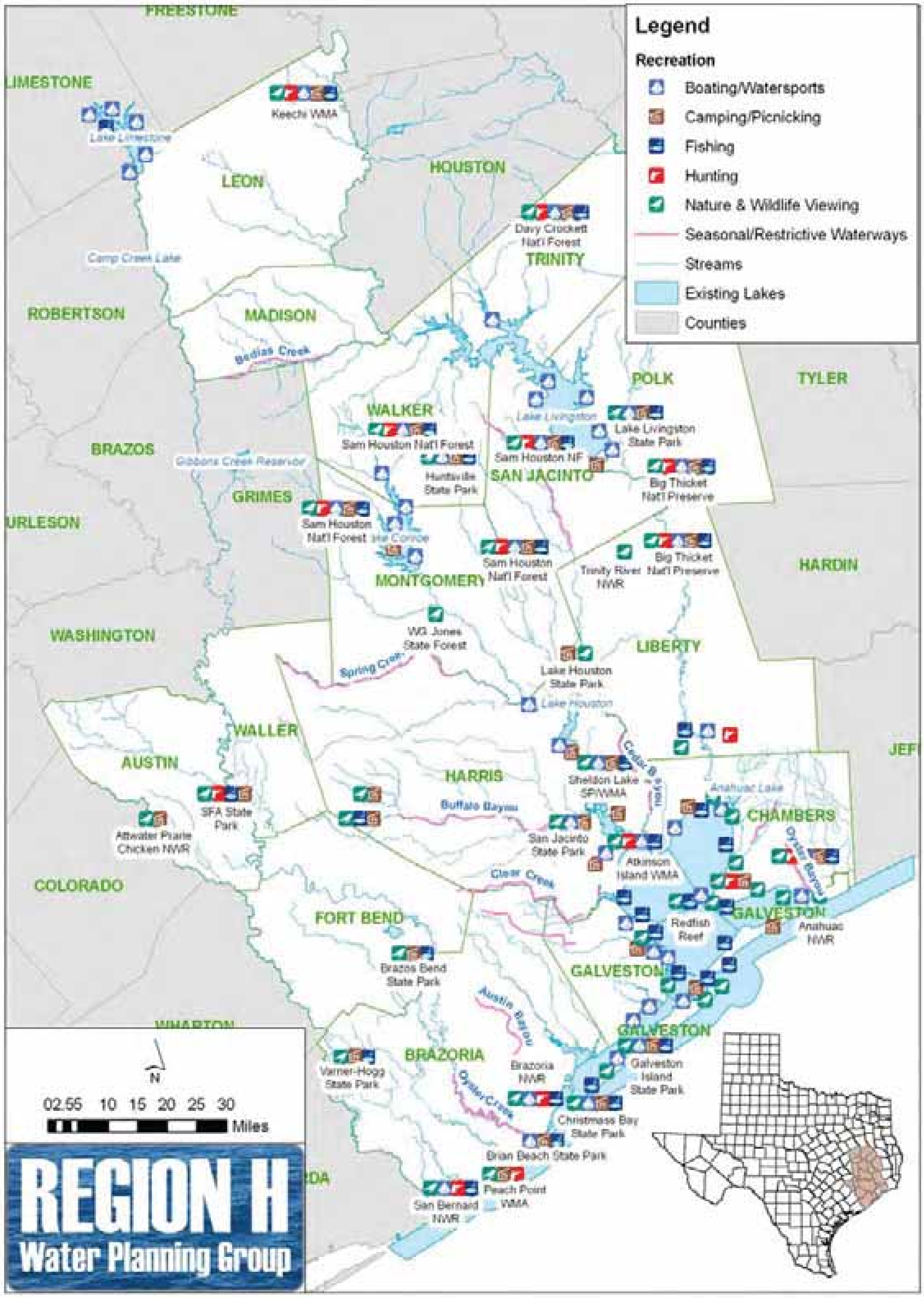
Table 1-14

Threatened and Endangered Species

County	Species (2006 Plan)	New Species	Current County Total
Austin County	4	4	8
Brazoria County	3	13	16
Chambers County	3	13	16
Fort Bend County	3	2	5
Galveston County	4	11	15
Harris County	4	11	15
Leon County	4	4	8
Liberty County	7	5	12
Madison County	3	3	6
Montgomery County	6	4	10
Polk County	6	4	10
San Jacinto County	6	4	10
Trinity County	0	7	7
Walker County	5	4	9
Waller County	5	5	10

Figure 1-8

Public Lands within Region H



1.6 Existing Water Planning

1.6.1 Existing Regional and Local Water Management Plans

The first Region H Water Plan was published in 2001 and was incorporated into the State Water Plan in 2002. The last update to the Region H Water Plan was performed in 2006. The 2006 Region H Water Plan recommended several water management strategies to ensure that all water demands in the Region were met. First, water conservation was recommended for all municipalities with projected shortages. Next, supplies that were identified as surplus in one area were recommended for contract or sale to water users in other areas. These transfers included moving TRA water supply from Lake Livingston to Harris County, moving SJRA supplies from the Trinity Basin to Montgomery County, additional yield from system operation of the BRA system and future reservoir projects. Two new reservoirs were recommended: Allens Creek Reservoir in Austin County to capture peak flows in the Brazos River, and Little River Off-Channel Reservoir in Milam County to supply Region H and the Brazos G Region. In areas with limited groundwater, irrigation conservation was recommended as a means of increasing groundwater for municipal supply.

The Region H area was formerly part of The Trans-Texas Water Program (TTWP): Southeast Area, a comprehensive water resource planning program created to evaluate a full range of water management strategies for a 32 county area of East Texas. This area encompassed all of Region H, plus the lower Sabine River Basin and portions of the middle Brazos River Basin. *The Phase II Report* (1998) identified a regional long-term shortage by the year 2035. To meet that need, several management techniques were studied further: water conservation, wastewater reclamation, use of existing reservoir surplus supply, coordinated reservoir system operation, interbasin transfers and contractual transfers.

Technical studies of these management techniques were completed in Phase II of the TTWP. The *Phase II Report* (1998) determined that the Southeast Area could develop adequate supplies to meet expected regional demands, and export water to Central Texas (Regional Planning Regions L and N). Various management strategies would need to be implemented to accommodate growth in the different geographic areas across the fifty-year planning period. Water conservation, wastewater reclamation and coordinated systems operations strategies would extend the period of adequate supply, allowing additional time to plan and develop new water sources. The Allen's Creek Reservoir in the Brazos River Basin, with an estimated yield at the time of approximately 70,000 acre-feet per year, was reported as a potentially feasible project. Contractual transfers were identified that would align surface water rights with the owner's service areas, shortening conveyance systems. Finally, sustained interbasin transfers from the Toledo Bend Reservoir in the Sabine River Basin to the Trinity and San Jacinto River Basins were also reported as feasible strategies to meet the growing needs of the region and areas of central Texas.

Other previously completed regional water supply plans include the City of Houston Master Plan, Brazos Valley Long-Range Resource Plan, the San Jacinto River Authority Water Resources Development Plan, and the Trinity River Basin Master Plan. Within Region H, the BRA plan also recommended development of the Allen's Creek Reservoir. The SJRA plan recommended development of two reservoirs: Lake Creek and Spring Creek. These projects were put on hold when the SJRA purchased part of the Devers Canal Systems water rights, which allowed the transfer of approximately 50,000 acre-feet per year from the Trinity River Basin. The TRA recommended the development of thirteen potential reservoirs, six of which are located in Region H. The largest, Bedias Reservoir, could provide a formerly estimated 109,000 acre-feet per year, and is located to allow use in the Trinity, San Jacinto or Brazos River Basins.

The Harris-Galveston Subsidence District and Fort Bend Subsidence District developed Groundwater Management Plans to address subsidence through reduced groundwater extraction within their respective regulatory areas. These districts adopted regulatory plans in 1999 and 2003, respectively, setting limits on groundwater use as a percentage of total water demand. Three of the four new groundwater conservation districts (GCDs) in the region, Bluebonnet, Lone Star and Mid-East Texas GCD, have published groundwater management plans and started the collection of well data needed to consider if a regulatory plan is needed. The Brazoria County Groundwater Conservation District was confirmed by county voters in November 2005.

Additional plans are noted in the Region H Bibliography, included as *Appendix 1A*.

1.6.2 Current Preparations for Drought

The 1997 State Legislature mandated water conservation and drought contingency planning for all holders of municipal, industrial and non-irrigation water rights of 1,000 acre-feet or more and irrigation rights holders of 10,000 or more acre-feet. Previously, all water rights permit applications required a water conservation and drought contingency plan but existing rights holders were not required to prepare or implement plans. New regulations also distinguish between water conservation and drought contingency plans and extend the requirement to prepare and implement drought contingency plans to all holders of water rights as noted above and to public water systems with over 3,300 connections.

In the completed drought plans, the predominant response activities are first a public information effort to alert the public to drought conditions and encourage water conservation. If drought conditions persist, many plans impose mandatory water conservation measures, including restrictions on landscape watering and car washing. Water Conservation and Drought Response are discussed in *Chapter 6* of this report.

1.6.3 Region H Drought Management Study

The Region H Water Planning Group (RHWPG) requested and received funding from the Texas Water Development Board (TWDB) to conduct three studies in advance of the 2011 update of the Region H Water Plan. One study focused on evaluating the impacts of future water management strategies on freshwater inflows to Galveston Bay and on evaluating the impacts of instream flow requirements for future water management strategies. A second study focused on evaluating the feasibility of using available “interruptible” surface water supplies as a substitute for existing firm water supplies for certain uses, notably irrigated agriculture. The third study focused on evaluating the efficacy and impact of drought contingency (a.k.a. drought response) measures as a potential water management strategy in Region H. The key question addressed by this study was:

Can implementation of drought contingency measures within Region H during critical drought periods be used in lieu of other water management strategies to meet projected water demands?

The scope of work for the Region H Drought Management Study was divided into two primary tasks. The first task focused on evaluating the efficacy or effectiveness of drought contingency plans adopted and implemented by municipal water suppliers within Region H, elsewhere in Texas, and nationally. The second task consisted of a quantitative evaluation of the potential impact of drought response measures on major water supply reservoirs in Region H, namely Lake Conroe, Lake Houston, Lake Livingston and the proposed Allens Creek Reservoir. Specifically, Texas Commission on Environmental Quality (TCEQ) water availability models were used to analyze reservoir conditions (i.e., levels and storage volumes) during critical drought periods both with and without implementation of drought response measures.

The study found that most drought contingency plans place a heavy emphasis on “demand management measures” that are designed to reduce water demands by means of curtailment of certain uses. It’s important to note that demand management in this context is distinctly different from water conservation, although the terms are often used interchangeably. The objective of water conservation is to achieve lasting, long-term reductions in water use through improved water use efficiency, reduced waste and through reuse and recycling. By contrast, demand curtailment is focused on temporary reductions in water use in response to temporary and potentially recurring water supply shortages or other water supply emergencies (e.g., equipment failures caused by excessively high peak water demands). Common approaches to water demand curtailment, applied individually or in combination, include:

- Prescriptive restrictions or bans on non-essential water uses and waste. In a municipal setting such restrictions commonly target landscape irrigation, car washing, ornamental fountains, etc.

- Use of water pricing strategies, such as excess use surcharges, to encourage compliance with water use restrictions or to penalize excessive water use.

- Water rationing, where water is allocated to users on some proportionate or pro rata basis.

A significant number of public water systems in Region H were found on the TCEQ drought impact list and implemented drought measures during the years 1998 (62 systems), 2000 (35 systems) and 2005 (39 systems). The counties that recorded the most public water systems on the list are Harris and Montgomery counties. Together, Harris and Montgomery Counties accounted for approximately 55 percent of the systems on the drought impact list. Approximately 90 percent of the water systems on the drought impact list serve populations less than or equal to 10,000 people and have 5,000 or fewer connections. TCEQ records also indicate that the list is comprised mostly of public water systems that are supplied by groundwater.

Surveys of major public water systems indicated that none of the Region H public water systems that were on the TCEQ drought impact list over the period from 1996 to 2008 experienced actual water shortage conditions. Rather, it appears that these water systems were placed on the list because of high seasonal peak water demands and attendant problems or concerns with water production infrastructure. The majority of Region H public water systems on the TCEQ drought impact list are municipal utility districts (MUDs), water supply corporations (WSCs), subdivisions and rural municipalities that rely on groundwater from local wells. Sustained high peak water demands during the summer months often create a strain on groundwater supplies, not so much in terms of the availability of supply but rather in terms of groundwater production capacity, indicating a need for additional wells to increase delivery capacity or deeper wells to compensate for greater than normal drawdown. Public water systems that rely on surface water often experience similar problems in terms of limited capacity to treat raw water and/or distribution system capacity limitations.

The study found that there is very little “good” empirical research to quantify the effectiveness of drought response measures. Most water suppliers that have implemented DCPs have not thoroughly evaluated the effects. “Post-event” analyses was found to typically only report “gross” changes in water demand, most commonly expressed as a percentage reduction. It was also found that most DCPs in Texas are focused on seasonal peaking problems rather than actual water shortage and are always addressed at peak shaving.

The Drought Management Study concluded that, while drought contingency planning is a critical component of water supply management and may provide short-term benefits during severe drought conditions, drought management alone will not replace any recommended long-term water management strategies. The results of the Drought Management Study are discussed in further detail in *Chapter 6* of this report.

1.6.4 Water Loss Audits

An important part of a municipal conservation plan is minimizing the amount of water loss in their distribution system. The 78th Texas Legislature passed House Bill 3338 to provide the TWDB with a mandate to require water loss audits by suppliers. The first water loss audit deadline for submission to the TWDB was by March 31, 2006. Public utilities will be required to perform water loss audit at least once every five years and provide the data to the TWDB.

The water loss reporting followed a methodology recommended by the International Water Association (IWA) and the American Water Works Association (AWWA) Water Loss Control Committee. The methodology relies on defined water use categories as shown below:

Water Losses:

- Apparent Losses represent water that was used but not paid for, resulting in lost revenue. Apparent Losses include:
    - Unauthorized Consumption
    - Customer Meter Under-registering
    - Billing Adjustment and Waivers
- Real Losses represent water that is physically lost from the water system prior to use, resulting in lost revenue. Real Losses include:
    - Main Breaks and Leaks
    - Storage Overflows
    - Customer Service Line Breaks and Leaks

The study results found a high level of inaccuracy, particularly in Regions B, H and M suggesting that utilities in the regions should refine their water accounting procedures. Within Region H, the study utilized information provided by 638 utilities. The utilities ranged in type and were categorized as City, MUDs, SUDs, WCIDs, WSCs or Other. The number of utilities in each category along with the estimated total Apparent Loss, Real Loss, and Total Losses are presented in *Table 1-15*. The Total annual value of the reported water loss in Region H ranged from a lower bound value of approximately $33,800,000 to an upper bound value of $128,200,000. The large discrepancy between lower and upper bound estimates is the result of inaccuracies in the water loss estimates.

Table 1-15

Water Loss by Type (acre-feet per year)

Utility Type	**Number**	Total Apparent Loss		Total Real Loss		Total Loss	
		Min	Max	Min	Max	Min	Max
City	49	0.0	4669.4	0.0	3182.4	0.0	4750.5
MUD	281	-5.3	185.8	0.0	165.5	-4.7	251.5
SUD	36	0.0	227.3	0.0	96.1	0.0	182.3
WCID	24	0.0	865.9	0.0	302.2	0.0	1168.1
WSC	147	-0.2	116.3	0.0	55.6	-0.2	135.1
Other	101	0.0	865.9	0.0	314.8	0.0	1168.1
Total	638	0.0	0.0	0.0	0.0	0.0	0.0

The study made the following recommendations for utilities and the Regional Water Planning Process:

- Utilities should implement annual or biennial programs to gradually reduce the uncertainty in their water audits. The programs should target water audit categories with the most uncertain water volume estimates.

- Regional Water Planning Groups should use the research results to estimate the potential water savings from water system audits and loss prevention strategies and should update the regional water plans accordingly.

- The TWDB should work to align the regional water planning cycle and the water audit reporting cycle so that up-to-date water loss data is used in developing the regional water plans.

1.7 Recommendations Made in the 2006 Region H Water Plan

In the 2006 Region H Water Plan, the RHWPG recommended twenty-two water management strategies to meet projected water demands through the year 2060. The planning group recommended eight stream segments and four reservoir sites as unique, and also recommended regulatory, administrative and legislative changes to the Legislature. Those recommendations are listed below.

1.7.1 Water Management Strategies Recommended in the 2006 Regional Plan

The RHWPG considered a variety of strategies for meeting the projected shortages and solicited input from the public before adopting a management plan. A detailed analysis process was developed to define potential water management strategies. The process addressed the specific shortages of 193 WUGs and then developed associated specific strategies assuming Major Water Providers would be the vehicle to solve WUG shortages. The process generally consisted of the following:

Municipal Conservation – For WUGs with projected shortages, an appropriate level of water conservation would be implemented, as discussed below.

Contract Extension and Increase – For all WUGs currently served by a wholesale water provider (WWP), it was assumed that current contracts would be renewed throughout the planning period. Additionally, it was assumed that WUGs would increase their contracts with their current WWPs to meet projected growth, until current WWP supplies were fully allocated. This could not be applied to collective WUGs, such as Manufacturing.

This met the supply needs for 15 of the 193 WUGs with shortages. The remainder of the WUGs with shortages were grouped and addressed by county. Potential water management strategies were screened and considered to meet the needs of each county. The strategies considered included those in the 2001 Regional Water Plan, new water rights applications, wastewater reuse and seawater desalination. The consideration of new supply sources allowed the RHWPG to replace two reservoir projects recommended in the 2001 Plan. Management strategies that involved adjoining regions were coordinated with the appropriate water planning group.

The water management strategies selected in the 2006 Region H Water Plan to meet the projected growth were as follows:

Municipal Conservation—The conservation strategy was applied at the WUG level, reducing demands from 5.5% to 7.0%, depending on the size of the WUG. Projected water savings totaled 71,109 ac-ft/yr in year 2030 and 101,200 ac-ft/yr in year 2060.

Industrial Conservation—Industries with projected shortages will seek out ways to reduce their water demand as a means of managing their operating costs. The wide range of industries within Region H, and their varying progress in this area, prevented the estimation of projected savings for this strategy.

Irrigation Conservation—Reduction of on-farm demands through land leveling, canal lining and other system improvements. Projected water savings were 18,792 ac-ft/yr in Brazoria County, 24,018 a-ft/yr in Chamber County, 5,198 ac-ft/yr in Fort Bend County, 2,392 ac-ft/yr in Galveston County, 20,877 ac-ft/yr in San Jacinto County and 6,606 ac-ft/yr in Waller County.

Expanded Use of Groundwater—Only a portion of the groundwater available to Region H is developed supply (i.e., existing wells). An additional 91,500 ac-ft/yr of new well capacity was needed to fully utilize this resource.

New Contracts for Existing Supply— WWPs with unallocated existing supplies were identified, and new contracts were recommended within existing service areas.

Luce Bayou Transfer—This conveyance project enables the City of Houston to transfer water it owns in the Trinity basin to Lake Houston to meet projected growth in north and northwest Harris County.

Brazos River Authority System Operations—The Brazos River Authority has applied for a water right that permits existing additional yield within their reservoirs, and new yield that can be achieved through operation of their reservoirs as a basin-wide system. Approximately 120,000 ac-ft/yr of this water was estimated to be available for customers in Region H in the 2006 plan..

Allen's Creek Reservoir—This proposed reservoir creates 99,650 ac-ft/yr of supplies for the City of Houston and the Brazos River Authority.

Little River Off-Channel Reservoir—This proposed reservoir creates 32,100 ac-ft/yr for the Brazos River Authority.

Non-Municipal Contractual Transfer—This strategy involved the transfer of 21,000 ac-ft/yr of manufacturing, mining and irrigation supplies from WUGs with surpluses to WUGs with needs in Brazoria and Galveston Counties.

Wastewater Reclamation for Industry—This strategy proposed that 67,200 ac-ft/yr of Houston's municipal wastewater be treated and directly reused by industries along the Houston Ship Channel.

Houston/Trinity River Authority Contract—Under this strategy, the City of Houston would purchase up to 150,000 ac-ft/yr of uncommitted supplies from the Trinity River Authority.

SJRA/Trinity River Authority Contract— Under this strategy, the SJRA would purchase up to 50,000 ac-ft/yr of uncommitted supplies from the Trinity River Authority to serve Montgomery County.

Houston to Gulf Coast Water Authority Transfer—Water transfer strategy in which Houston would provide 28,000 ac-ft/yr to the GCWA in Galveston County, beginning in 2050. The GCWA then reallocates their existing Brazos River supply to meet demands in Fort Bend County. Included was a pumping station and pipeline to convey the water to the GCWA's Texas City reservoir.

Houston Indirect Wastewater Reuse—The City of Houston had applied for a water right permit to indirectly reuse up to 580,900 ac-ft/yr of wastewater discharges. A portion of that was recommended for direct reuse to industry. An additional 98,000 ac-ft/yr was recommended for use beginning in 2050.

NHCRWA Indirect Wastewater Reuse—The North Harris County Regional Water Authority was estimated to have the potential to indirectly reuse up to 157,000 ac-ft/yr of wastewater discharges. 31,400 ac-ft/yr was recommended for use beginning in 2060.

Lake Houston Additional Yield—Volumetric surveys and WAM analysis showed that Lake Houston could yield an additional 32,500 ac-ft/yr of supply (declining over time due to storage losses to sedimentation).

Freeport Seawater Desalination—A pilot plant is being considered under the Governors Desalination Initiative, with an initial capacity of 11,200 ac-ft/yr and a recommended increase to 33,600 ac-ft/yr.

Brazos Saltwater Barrier—A proposed gated structure on the lower Brazos above Freeport to protect lower basin intakes from the seasonal saltwater influence, which is expected to worsen as the basin is fully utilized.

Redesignation of Existing Water Rights—WWPs who identify local changes in water usage types due to development are recommended to add appropriate usage types to their water rights permits.

New San Jacinto River Water Rights—The SJRA and City of Houston have jointly applied for an interruptible supply permit on the San Jacinto River. The conjunctive use of this supply with existing supplies owned in the Trinity River Basin would reduce interbasin transfers in non-drought years.

New Harris County Bayous Water Rights—The City of Houston had applied for an interruptible supply permit in the lower San Jacinto basin. The conjunctive use of this supply with existing supplies owned in the Trinity River Basin would reduce interbasin transfers in non-drought years.

The 2006 Region H Water Plan met all projected water demands, at an estimated capital cost of $5.5 billion for the recommended water management strategies.

1.7.2 Unique Streams Segments Recommended in the 2006 Regional Plan

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value. The selection criteria established within the Texas Water Code are as follows:

- Biological Function
- Hydrologic Function
- Riparian Conservation Area
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value
- Threatened or Endangered Species/Unique Natural Communities

Stream Segments designated by the legislature as having unique ecological value cannot be developed as reservoir sites by the State or any political subdivision of the State. After consideration of the above factors, the Region H 2006 Water Plan recommended the following eight streams for designation as Streams of Unique Ecological Value in Region H:

Table 1-16

Recommended Unique Stream Segments

Stream Segments (not in priority order)	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Lake Creek	Brazoria
Menard Creek	Liberty, Hardin*, Polk
Oyster Bayou	Chambers

*(Hardin County is in Region I)

The entire stream segment length was recommended for Armand Bayou and Menard Creek (segment within Region H). For the remaining streams, only those portions adjacent to or within riparian conservation areas were recommended as unique streams. The unique stream segments have been designated by the Legislature in Senate Bill 3, Section 4.02.

1.7.3 Unique Reservoir Sites Recommended in the 2006 Regional Plan

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected two surface water reservoir projects, Allens Creek and Little River Off-Channel, for inclusion in the 2006 Regional Water Plan. Two additional reservoir projects, Bedias Reservoir and Little River Reservoir were recommended in the 2001 Plan but were replaced in the 2006 Plan by different water management strategies. The RHWPG had decided to recommend the locations of each of these projects as unique sites. In 2007 the Texas Legislature adopted the unique reservoir sites recommended in the 2007 State Water Plan, which were amended to the Texas Water Code.

The four sites were:

Table 1-17

Recommended Unique Reservoir Sites

Name	County	General Location
Allen's Creek	Austin	1 Mile N. of the City of Wallis
Little River, Off-Channel	Milam	Beaver Creek, approx. 5 Miles NE of City of Milano
Bedias	Madison (Principally)	Bedias Creek, 3.5 Miles W. of State Hwy 75
Little River	Milam	Main Stem of Little River, Immediately Upstream of its Confluence with the Brazos River

1.8 Regulatory, Administrative and Legislative Recommendations

Section 357.7(a)(10) of the Texas Water Development Board regional water planning guidelines requires that a regional water plan include recommendations for regulatory, administrative, and legislative changes. These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed towards the Texas Commission on Environmental Quality (TCEQ), that administrative recommendations are directed towards the Texas Water Development Board (TWDB), and that legislative recommendations are directed towards the State of Texas Legislature. The Region H Water Planning Group has currently adopted the following regulatory, administrative, and legislative recommendations:

1.8.1 Regulatory and Administrative Recommendations from the 2006 Plan

Clarify the agency rules to address consistency with the regional water plans.

Water rights applications must be consistent with the Regional Water Plans in order to be approved. The TCEQ has interpreted this to mean that the requested water right must be directly linked to a recommended water management strategy; otherwise the applicant has had to petition the RWPG for a plan amendment to add their permit application. RWPGs should not be required to formally adopt or amend the regional plan to include a proposed management strategy for water supply in order for new water rights applications to be evaluated by the TCEQ. This creates a situation that can deter the study of viable alternatives by agencies outside the RWPG and may ultimately block their ability to obtain permits for new supplies that the agencies need to meet their future needs. These alternatives may be preferable to existing management strategies (such as building reservoirs) that were previously recommended by the RWPG. A water right application that is not in conflict with the regional water plan (i.e., does not compete for supply allocated in the plan) should be considered consistent with the plan by the TWDB and TCEQ. If the strategy would benefit the region, it could then be added to the plan as a formal management strategy in the next five-year update, undergoing the full analysis, consideration and Public Hearing process.

The Region H Water Planning Group recommended that the Agency rules be amended to clarify the consistency requirement. Only those water rights applications in conflict with the current regional water plan should be referred to the RWPG for amendment.

Allow more flexibility in the allocation of alternate or multiple water management strategies to meet defined water shortages.

Section 357.7(a)(9) of the TWDB Regional Water Planning guidelines requires “specific recommendations of water management strategies to meet the needs…” The TWDB interpretation of these requirements suggests a direct relationship between a defined water shortage and a specific water management strategy. In reality, the WUG may have two or three possible suppliers that they could negotiate and choose between. Also, WUGs may form sub-regional groups to pursue more cost effective strategies than are achievable separately. This single-supplier option is a necessary assumption for the planning effort (so that the RWPG does not recommend more strategies than the region requires); however, it is unrealistic for the TWDB to hold the WUG to our recommended supplier. This bypasses the market and hinders competition. Correcting these WUG-Supplier associations in the plan (to allow TWDB funding assistance) requires a formal amendment and incurs costs related to that process. The RWPGs should not be placed in that position and the public should not bear that cost.

Additionally, WUGs and wholesale water providers may have several viable strategies to choose between. The RWPGs are limited to recommending the best or most feasible strategies, based upon the regional planning rules and assumptions. The individual WUG or WWP may opt to implement a different viable strategy, based on their own analysis and differing assumptions and criteria. Currently, reflecting this change between viable alternatives requires amending the regional water plan. If alternative strategies could be fully analyzed and recognized in the plan when it is adopted, they could be exchanged with recommended strategies without requiring a full amendment.

The Region H Water Planning Group recommends that the TWDB and the TCEQ interpret existing legislation to give the maximum possible flexibility to WUGs and suppliers. Legislative and regulatory changes should be made to remove this requirement for specificity from the regional water planning guidelines and allow plans to present multiple sources of supply where appropriate. Alternative strategies should be designated in the plan, where appropriate, to remove the single-strategy restriction placed on water users groups.

Following the 2006 Planning process the Texas Water Code was amended to allow the regional planning group to substitute one or more evaluated strategies In the event that a strategy recommended in the 2006 Plan is no longer recommended, the group may substitute on or more alternative strategies. The substitution must be approved by the Executive Administrator. Alternative strategies must be evaluated to the same extent as recommended strategies.

Modify the notification procedures for amendments to regional water plans that only affect a portion of the region.

The same notification requirements associated with adoption of a regional water plan should not be used upon amendment of a specific component of the plan. Based on the number of WUGs within the region, the RHWPG anticipates a number of plan amendments will be requested during every planning cycle. The majority of these plan amendments will only affect certain aspects of the plan and certain communities and water suppliers. The current notification requirements for the entire plan are expensive.

The Region H Water Planning Group recommends adoption of a revised set of notification procedures for those regional water plan amendments that only affect a limited portion of the region.

Following the 2006 regional water planning cycle, a minor amendment process was added to the Regional Water Planning Process. The minor amendment process allows the Regional Planning Groups to amend portions of the plan that affect only a portion of the Plan.

Clarify agency rules on quantitative environmental analysis.

The Regional Water Planning Guidelines require that the evaluation of potentially feasible water management strategies include a quantitative analysis of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico (31TAC357.7.(a)(8)(A)). The TWDB has provided detailed guidance on specific study methods to be used in determining population, water demand, socioeconomic impacts and yield from current and proposed supply sources, but has not provided similar guidance in the area of environmental impacts. This lack of specificity is resulting in different methods being used in different regions. Additionally, it places the planning groups at risk of needing to conduct additional analysis after state agencies review the Initially Prepared Plans, and add those results to the report after the public review period has closed.

The Region H Water Planning Group recommends that the TWDB determine, in conjunction with the TCEQ and TPWD, which specific environmental studies and analysis is required for each category of management strategy (i.e., new water right, new reservoir, etc.), and that guidance be added to the Planning Guidelines so that RWPGs can reflect these requirements in their budgets and scopes of work, and so that plans are consistent across the State.

TDPES Permitting of Wastewater Reclamation Facilities.

Existing Texas Pollutant Discharge Elimination System (TPDES) permit requirements do not encourage, and in fact discourage, wastewater reuse and reclamation.

In terms of wastewater reuse (e.g., without further treatment), a violation of an end-user's discharge permit could be caused by using effluent to replace or supplement another water source. An example would be an industry, whose discharge is close to its permitted limit for a given constituent, exceeding that limit by virtue of its use of effluent from a separate wastewater treatment plant.

In terms of wastewater reclamation (e.g., with further treatment), permitting the discharge from a wastewater reclamation facility could be difficult and unnecessarily expensive. Wastewater reclamation often entails advanced treatment of wastewater discharged from one or more treatment facilities for industrial use. If this advanced treatment facility is separate, it requires a separate TPDES permit. Under current TCEQ rules, discharges from a new facility are considered as occurring *in addition to* all currently permitted discharges, for the purpose of assessing the collective effect on the receiving stream. While this is the correct procedure for evaluating a discharge from a new waste source, it effectively double-counts the waste load from a reclamation facility (once at the original plant, and again at the additional treatment facility). Designing a reclamation facility to sufficiently mitigate this double-counting is unneeded and may be cost-prohibitive. In actuality, the waste load should be divided between the applicable facilities, depending upon the reuse and reclamation demands.

Therefore, the permitting process should be modified to address both reuse and reclamation projects that draw effluent from existing wastewater plants, so that daily loads may be accurately assessed on a combined maximum daily load and maximum daily concentration basis, and permitted accordingly.

The Region H Water Planning Group recommends that the TCEQ modify the rules for wastewater permitting, so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities.

1.8.2 Legislative Recommendations from the 2006 Regional Plan

Remove barriers to interbasin transfers of water within Region H.

Senate Bill One states that water rights developed as a result of an interbasin transfer become junior to other water rights granted before the interbasin transfer permit. The effect of this change is to make obtaining a permit for interbasin transfer significantly more problematic than it was under prior law and thus discourages the use of interbasin transfers for water supply. This is undesirable for several reasons:

- Current supplies greatly exceed projected demands in some basins, and the supplies already developed in those basins can only be used via interbasin transfers (i.e. Trinity Basin within Region H.)

- Interbasin transfers have been used extensively in Texas and are an important part of the state's current water supply. For example, three of the five Region H Major Water Providers (City of Houston, Trinity River Authority and San Jacinto River Authority) maintain current permits for interbasin transfers collectively of over 1,000,000 acre-feet per year. Virtually all future water demands within the San Jacinto basin (Harris County in particular) of Region H must rely on interbasin transfers.

- Emerging regional water supply plans for major metropolitan areas in Texas (Dallas-Fort Worth and San Antonio) rely on interbasin transfers as a key component of their plans. It is difficult to envision developing a water supply for these areas without significant new interbasin transfers.

The Region H Water Planning Group recommends that the legislature revise the current law on interbasin transfers and remove the unnecessary and counterproductive barriers to such transfers that now exist.

Adopt the recommended stakeholder process for determining bay and basin environmental flow requirements, and include Region H and the Galveston Bay Freshwater Inflows Group (GBFIG) in the Galveston Bay stakeholder group.

Region H contains many water-dependant natural resources, most significantly Galveston Bay, which provide ecological habitat for native and migratory species. Under current water law, waters of the state belong to the environment until appropriated for another beneficial use. As basins become fully allocated, a method of establishing a minimum environmental flow for each stream or estuary must be established, both to protect the environment and to facilitate water planning.

The Study Commission on Water for Environmental Flows delivered an interim report to the 79th Legislature. In that report, the study commission recommended, among other things, that the study commission be reauthorized, and that the commission appoint a Bay/Basin Area Stakeholder group for each bay/basin ecological area of the state. Such a group would then take prescribed actions leading to the establishment of environmental flow "set-asides" for its bay/basin ecological area. These values would be reviewed on a ten-year basis. The commission recommended that Galveston Bay be included on the first round bay/basins list.

The Region H Water Planning Group endorses the stakeholder process and requests that Region H and the Galveston Bay Freshwater Inflows Group (GBFIG) be represented on the Galveston Bay BBAS.

In 2007, Senate Bill 3 took effect beginning the environmental flows allocation process. The process began with the creation of the Environmental Flows Advisory Group and the Texas Environmental Flows Science Advisory Committee to guide the statewide process. Two basin and bay area stakeholder groups have been formed to develop recommendations concerning environmental flow regime, associated policy considerations, and strategies to meet the flow recommendations that will impact environmental flows in Region H. The Trinity and San Jacinto Rivers and Galveston Bay Stakeholders Committee was appointed in July of 2008 and the Brazos River/Bay and Estuary Area Stakeholder Committee will be appointed by June 1, 2010.

Increase funding for the Bays and Estuaries programs of state resource agencies and for additional monitoring and research to scientifically determine freshwater inflow needs.

The RHWPG has adopted specific language associated with establishment of freshwater inflows to maintain the health and productivity of the bay. Galveston Bay is an important economic and recreational resource for our region. Current levels of funding within the State of Texas Bay & Estuary program are insufficient to continue the needed monitoring, study and development of management strategies for the bay.

The Region H Water Planning Group recommends establishment of additional funding to pursue necessary future efforts of the Galveston Bay & Estuary program.

Maintain the current rule of capture basis of groundwater law within Texas in all areas not subject to defined subsidence or groundwater conservation districts.

Groundwater is a vital resource within Region H. This is especially true within the rural counties of the region that are predominantly dependent on groundwater. Current groundwater law based on the

Rule-of-Capture has facilitated orderly development of groundwater systems throughout the State of Texas and, barring the intrusion of private interests, could continue to serve the water usage interests throughout the state. It appears that the Rule-of-Capture could continue per the status quo to serve the groundwater interests within the region.

The Region H Water Planning Group supports continued usage of the Rule-of-Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts.

Support development of Groundwater Conservation Districts to protect current groundwater users, and encourage these districts to study and manage aquifer storage and recovery.

Region H communities, particularly those within the rural areas of the region, are dependent on groundwater supplies. Groundwater is a very valuable resource to this region. Region H contains counties, specifically Austin, Leon and Madison where some municipalities, water supply corporations and property owners believe Groundwater Conservation Districts (GCD) are needed to retain long-term groundwater supplies within their respective counties. Region H also has several counties, including Brazoria, Waller and Montgomery, where groundwater supplies will, in theory, reach their maximum sustainable yield due solely to projected in-county water usage rates. A GCD is a potential vehicle for these counties to manage and protect groundwater supplies from over-development within each respective county. The potential of losing these supplies to outside interests before the county of origin can maximize the use of these supplies would create a burden on local water users.

The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.

Senate Bill 2 of the 77th Legislature authorized the formation of four new GCDs in Region H (Bluebonnet, Brazoria County, Lone Star and Mid-East Texas).

Establish financing mechanisms for development of new water supply projects identified within the adopted regional water plans.

The Region H Regional Water Plan includes development of several surface water reservoirs and other supply projects. The capital cost to develop these projects is significantly higher than the historic cost of water supply projects. The projected costs are such as to dissuade local communities from making a financial commitment to support future projects. These financing issues will delay the implementation of needed projects.

To address this situation, the Region H Water Planning Group supports establishment of financing methods by the State of Texas to capitalize a fund to support development of water supply projects recommended within adopted regional water management plans.

Following completion of the 2001 Regional Plan, the Regions conducted an Infrastructure Financing Survey among their WUGs with projected infrastructure needs, and reported those results to the Legislature. This is now a required task within the cyclic regional water planning process.

Act on the RHWPG recommendations of unique stream segments and unique reservoir sites.

While the RHWPG adopted both unique stream segment and reservoirs, there appears to be some confusion on the definition and legislative intent of the designations for each of these elements. It is clear that conflicts may be created for stream segments that might be used for both water supply conveyance and recreational purposes. To assist in the adoption of future unique stream segments and/or unique reservoir sites the RHWPG requests additional legislative clarification.

The Region H Water Planning Group supports clarification and definition of the legislative intent of the unique stream segments and of the unique reservoir sites.

Senate Bill 2 of the 77th Legislature amended the Water Code to restrict political subdivisions from taking certain actions within unique stream segments and unique reservoir sites. Senate Bill 3 amended the Texas Water Code to adopt the unique stream segments and unique reservoir sites recommended in the 2007 State Water Plan.

Continue funding of the State of Texas Groundwater Availability Modeling effort.

Many areas of Region H are totally dependent on groundwater to support the long-term viability of these areas. The current Groundwater Availability Modeling effort is supported since it is the most comprehensive groundwater assessment and analysis effort of the previous 20 years. The current GAM effort, however, omits minor aquifers and other groundwater considerations that are vital for certain local communities.

The Region H Water Planning Group supports continued funding for the GAMs effort, and recommends comprehensive analysis of all groundwater resources within the state.

The TWDB, in conjunction with the USGS, is continuing the GAM process.

Establish funding for agricultural research into the area of efficient irrigation practices.

The Region H water management plan includes a number of irrigation conservation based water management strategies. It is apparent that adoption of irrigation conservation practices may benefit the irrigation and agricultural industry in addition to local communities that may take advantage of water supply savings resulting from irrigation conservation. Additionally, the RHWPG supports further research and development of water-efficient and drought-resistant crop and species.

The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.

Implement the programs recommended by the Water Conservation Implementation Task Force.

The RHWPG strongly supports water conservation at all levels, and has incorporated it in the regional water plan as a management strategy. However, realizing advanced conservation savings in municipal county-other areas may be difficult, as these practices require some management, funding and oversight. While the RHWPG does not advocate a one-size-fits-all conservation program for the State of Texas, they recommend that the legislature address water conservation and provide some guidance and ability for county and local governments to implement these programs.

The Region H Water Planning Group supports water conservation and recommends that the legislature address and improve water conservation activities in the state.

The 78th Legislature appointed a Water Conservation Task Force to study water conservation policies and best management practices. The Task Force reported their results to the 79th Legislature in 2005.

Establish funding for research in advanced conservation technologies.

The Water Conservation Implementation Task Force identified numerous best management practices in TWDB Report 362 – Water Conservation Best Management Practices Guide. The Best Management Practices outlined that report were developed using information compiled from past research and studies along with information provided by the task force members. Additional water-saving technologies may still be developed in the future.

The Region H Water Planning Group recommends that the State fund research into advanced conservation technologies.

Resolve the issues related to water rights permitting for indirect reuse, and advocate water reuse statewide.

The TCEQ water rights permitting process for wastewater reuse needs to be clarified. Conflicts exist between Texas Water Code Sections 11.042 and 11.046 regarding the permitting of indirect reuse water. Section 11.042(c) states that return flows, once introduced to the stream, are property of the State of Texas and are therefore subject to appropriation by others. However, Section 11.046(b) and (c) allow the owner of return flows to obtain a bed-and-banks permit to transport this water to a place of reuse. This leads to potential conflicts between downstream appropriators and those who wish to indirectly reuse effluent.

Furthermore, the TCEQ has issued some water rights permits based on the existence of return flows in the river, and in the adjudication process some claims were established based on return flows. Additionally, some bed and banks permits were issued with priority dates, while others were issued without priority dates. Because of these issues and the conflicts discussed above, it is difficult to analyze indirect reuse as a water management strategy. Due to these significant unknowns and outstanding questions, the benefits and yields from reuse projects cannot be accurately estimated under the current regulatory environment. Specific regulatory issues that need to be resolved or clarified are outlined below:

- A policy for establishing a priority date, if any, for an indirect reuse authorization (i.e., bed-and-banks authorization) should be developed.

- Conflicts between Texas Water Codes 11.042 and 11.046 relating to the ownership of return flows (water right holders, groundwater users, and the State) need to be resolved.

- A policy for establishing the method and technical approach for evaluating indirect reuse permits (i.e., “no injury” analysis, WAM Run 3, WAM Run 8, etc.) needs to be developed.

- Clarification regarding the ownership of return flows and the right to permit return flows for indirect reuse needs to be provided. The issue of third-party permitting of return flows needs additional clarification.

- Additional clarification regarding the notification requirements for reuse permits, addressing both new discharges and historically discharged effluent, should be developed to ensure the protection of existing water rights.

These above issues directly impact water management strategies recommended in the Region H Water Plan, and therefore regulatory clarification is required.

The RHWPG recommends that TCEQ resolve the issues related to the permitting of indirect reuse water rights. In addition, the RHWPG supports wastewater reuse as a management strategy, and recommended it be advocated statewide through targeted State funding or other incentives to promote reuse projects.

Establish flood damage liability limits for water supply reservoirs.

Flood control reservoirs are generally drawn down at the beginning of the annual wet season so that when large rain events occur, the runoff may be captured and later released more slowly into the receiving stream. These reservoirs therefore reduce downstream flood levels and prevent inundation in low areas. In contrast, water supply reservoirs are operated to capture and retain as much streamflow as allowable under their permits, in order to have supply available during periods of high demand. This practice results in less available storage volume to capture runoff during major storms. When a major storm event occurs upstream or above a water supply reservoir, the reservoir operator must sometimes release flood flows during and after the event to prevent flooding upstream of the reservoir or to prevent damage to the dam and other facilities associated with the reservoir. This flood flow can contribute to downstream flooding, but with most reservoirs, actually reduces the amount of flooding which would have occurred had the reservoir not been constructed.

In recent years, plaintiffs with property in the downstream floodplains have brought multiple lawsuits against major water supply reservoir operators. Some recent court decisions have held the operators liable for damages to the downstream properties. If this trend is allowed to continue, this will force insurance rates for these entities to rise and operational changes to occur that may result in less available water storage for periods of need. The net effect to water users will be an increase in the cost of surface water throughout the state.

Consider State legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.

Continue funding of the Regional Water Planning process.

It is apparent that the RWPGs will have to meet periodically to address changed conditions related to the adopted regional water management plans. Ongoing activities will include, but not be limited to:

- Consideration of additions and modifications to the adopted plans
- Serving as communications liaisons with the water user communities within each region
- Assisting in the reconciliation of inter-regional water issues

It will be necessary to consider additional funding to support maintenance of the RWPGs. Also, the administrative provisions of Senate Bill One and the subsequent policies that have been enacted should be reviewed to determine if the appropriate organizational structure exists to accomplish the work of the RWPGs. Additional funding should be developed to support technical studies necessary to support the needs of the RWPGs.

The Region H RWPG recommends that the TWDB request additional funding and adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs.

The current round of Regional Water Planning is funded by the TWDB, with no requirement for local funding participation.

1.8.3 Infrastructure Financing Recommendations

Increase the funding of the State Participation Program as needed to allow development of water supply projects sized to meet projected long-term demands.

This program enables the TWDB to assume a temporary ownership interest in a regional project when the local sponsors are unable to assume debt for an optimally sized facility. Payments on the funds provided by the State are deferred until a customer base grows into the capacity it funded. The deferred interest payments do not accrue additional interest. By funding up to 50% of a project, the program helps the local sponsors optimize facility sizes and avoid later expansions and replacements.

This program will be extremely important for the development of the recommended water management strategies, as well as for water treatment and distribution systems. Large projects, particularly reservoirs, must be developed in anticipation of future demands due to the long periods of time required for planning, permitting, property acquisition and construction. For example, Bedias Reservoir, which would require a transmission system as well as the reservoir itself, was estimated to cost $194.3 million. The current customer base cannot support this high cost. The Bureau of Reclamation no longer funds the development of new water supply reservoirs and this project would not qualify for other federal funding. Therefore, the State Participation program is one of the few programs available to assist local sponsors with this water management strategy. Other reservoir projects within Region H could also experience similar financing issues.

The State Participation Program will also be important during the expansion of surface water service into areas affected by subsidence. As areas develop and implement Groundwater Reduction Plans it is expected that communities will develop plans for regional treatment and distribution systems to reduce costs. State participation in these facilities will allow them to be optimally sized at their inception. The State Participation Program offers the important advantage of reducing the unit costs for water service for both existing and future water users of the optimally sized facility.

The Region H RWPG recommends increased funding of the State Participation Program as needed to allow development of these water supply projects.

Increase the funding of the State Revolving Fund Programs in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.

These programs provide loans at subsidized interest rates for the construction of water treatment and distribution systems and for source water protection (DWSRF) and for wastewater collection and treatment systems (CWSRF). As the loans are paid off, the TWDB uses the funds to make new loans (thus the name Revolving Fund). State funds for the program receive a federal match through the Environmental Protection Agency. These loans are intended for projects to bring existing systems into compliance with rules and regulations, and are available to political subdivisions, water supply corporations and privately-owned water systems. Applications are collected at the beginning of each year, given a priority ranking, and funded to the extent possible. Projects not funded in a given year may carry forward into the next year’s ranking.

These programs are important in that they assist sub-standard water systems in attaining the minimum water quality mandated by Federal and State regulations, but they are not intended to fund system expansions due to projected growth. However, these programs may apply to individual systems in the Region experiencing water quality declines, or to those systems affected by the changed standard for Arsenic. The SRF may also provide assistance to water providers with aging treatment systems and transmission lines.

The Region H RWPG recommends increasing the funding of this program in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.

Increase funding of the State Loan Program to allow financing of near-term infrastructure cost projections.

The State Loan Program provides loans to Political Subdivisions and Water Supply Corporations for water, wastewater, flood control and municipal solid waste projects. Payments are not deferred in this program as they are under the State Participation Program, and the interest rates are not subsidized as they are in the Revolving Fund Programs. These loans are available for both local projects and for the local sponsors of regional projects. Acquisition and construction of water treatment and distribution systems are eligible for funding. Loans are made on a first come, first served basis.

This program will be heavily utilized in groundwater-served areas introducing surface water to meet current and projected demands. The availability of groundwater across the region has allowed development to occur outside existing surface water service areas. As the limits of available groundwater are reached (sustainable yields and/or regulatory limits), surface water treatment and transmission systems must be constructed to meet future demands. The costs are significant in that they are required in a short time span, instead of initiated and expanded over time as they are in areas originally served by surface water. Where local rate payers cannot afford to directly pay for conversion costs, State loans offer a significant cost advantage over most commercial and many public funding options, using the State's high bond rating rather than the rating of the local sponsor.

The Region H RWPG recommends increasing the funding of this program to meet near-term infrastructure cost projections.

Increase funding of the Agricultural Water Conservation loan program, leverage Federal grant programs by providing the local matching share, and consider adding a one-time grant or subsidy program to stimulate early adoption of conservation practices by individual irrigators.

The Region H water management plan includes a number of irrigation conservation based water management strategies. It is apparent that adoption of irrigation conservation practices may benefit the irrigation and agricultural industry in addition to local communities that may take advantage of water supply savings resulting from irrigation conservation. Additionally, the RHWPG supports further research and development of water-efficient and drought-resistant crop and species.

The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices. Provide a mechanism to leverage Federal grant programs by providing the local matching share. Increase funding of this loan program and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators.

Continue State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.

The Federal Community Development Block Grant program provides grants and loans to low-income communities for certain projects, including water and wastewater infrastructure. It is administered in Texas under the Office of Rural Community Affairs as the Texas Community Development Program. The Small Town Environment Program (STEP) under the TCDP provides water and sewer system grants to cities and counties not eligible for funding under the Colonias or Economically Disadvantaged Areas Programs (EDAP). Within Region H, there are no Colonias or EDAP-eligible communities, but STEP grants may be obtained.

The Region H Water Planning Group recommends continued State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.

Increase funding of the Regional Water Supply and Wastewater Facilities Planning Program in anticipation of upcoming development throughout the state, and expand the program to include the costs for preliminary engineering design and development of detailed engineering cost estimates of recommended facilities.

This program provides planning grants to Political Subdivisions for studies and analyses to determine feasible alternatives for regional water supply and wastewater facility needs. The planning must include more than one service area or political subdivision to be considered regional. Grants are generally limited to 50% of the total cost, and cannot be applied to the preparation of state and federal permits, administrative or legal proceedings of regulatory agencies, or the preparation of engineering plans and specifications.

This grant program can assist in planning for local areas, particularly the unincorporated areas of each county. Local sponsors investigating the best means to serve their populations may join with neighboring communities and water providers and request a planning grant, thus reducing their individual planning costs. Determination of the optimal institutional arrangement between political subdivisions is one of the eligible study areas under this program. Should a regional facility prove to be the best solution for the group, they may elect to pursue additional support from the State Loan and Participation programs.

One limitation of the program is that it cannot be applied to the detailed facility planning or preliminary engineering design of the proposed facility. These early engineering phase costs can represent as much as 30% of the cost of the facility, and generally must be completed before accurate financial requirements can be defined. Inclusion of these costs in either the planning grant or pre-project loan programs would better help these small communities develop the projects they need.

The Region H Water Planning Group recommends increasing funding of this program in anticipation of upcoming development throughout the state, and recommends expanding the program to include the preliminary engineering design costs for recommended facilities.

Support continued and increased funding of the USDA Rural Utilities Service programs at the Federal level, and fund the State Rural Water Assistance Fund.

This Federal program provides loans and grants in rural areas and communities of up to 10,000 people for water, wastewater, storm water and municipal solid waste projects. The program is intended for communities that cannot obtain commercial loans at reasonable rates. Loans are made at or below market rates, depending upon the eligibility of the recipient. Grants can cover up to 75% of project costs when required to reduce user costs to a reasonable level. A separate program of Emergency Community Water Assistance Grants (up to $500,000 per project) is also available to communities experiencing rapid declines in water quality or quantity.

This program is similar to the state loan and revolving fund programs. It offers another option to small communities and rural areas unable to finance required infrastructure without assistance. However, this is a nationwide program, and the competition for available funds is correspondingly greater. Colonias and border areas are specifically identified as target areas for the grant portion of this program, and it is therefore in the State's interest to support its continued funding.

The TWDB was recently authorized by the 77th Texas legislature to establish a similar program at the state level. The Rural Water Assistance Fund will provide low-interest loans to municipalities, water districts and non-profit water supply corporations. The program is still under development and has not yet been funded.

The Region H Water Planning Group recommends continued support and increased funding of this program at the Federal level, and funding of the State Rural Water Assistance Fund.

Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs.

The RHWPG considered desalination of brackish groundwater as a potential water source, but did not include it in the final plan because this strategy was more costly than other strategies. However, the RHWPG recognizes that the cost of desalination technology is decreasing, and that this strategy may merit consideration in future plans. It would be helpful and appropriate for the state to establish a program promoting desalination research and development. Such a program might offer financial assistance or incentives for project implementation.

The Region H Water Planning Group recommends that a research and development program for desalination be established in Texas, and that it include financial assistance and/or incentives for desalination project implementation.

Governor Perry sponsored a seawater desalination initiative to study seawater desalination along the Texas Coast as a future source of supply.

Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.

The Texas Water Development Board offers research grants to individuals or political subdivisions for water research on topics published in the Board's Request for Proposals. Eligible topics include product and process development.

In the Region H Water Plan, one recommendation to the legislature is to establish funding for agricultural research in the areas of efficient irrigation practices and funding for the development of water-efficient and drought-resistant crop and species. Irrigators cannot generally afford the increased cost of water when new supplies are developed in today's market. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming. This is another potential topic for the Water Research Program.

The Region H Water Planning Group recommends increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.

Support regulatory changes that will allow USACE to increase water supply storage in new reservoirs that they construct and manage, and investigate other alternatives for increased involvement of USACE in funding water supply projects.

The U.S. Army Corps of Engineers (USACE) builds and operates dams and reservoirs for flood control purposes under its Civil Works program. Congress authorizes funding on a project by project basis. Under current regulations, storage in these reservoirs may be used for present and future municipal and industrial water supply, but that portion of the project must be funded by a non-Federal agency. Also, only 30% of the M&I water storage may be allocated to future needs. The balance must supply existing water users, as the repayment schedule for non-Federal costs is capped at 30 years. USACE is also authorized to fund projects for navigation, water quality improvement and ecosystem restoration.

As a result of the first round of Regional Water Planning, the Texas Congressional Delegation requested a study on the potential for federal assistance with water supply in Texas. The Fort Worth District had recently published the Texas Water Allocation Assessment Report, which identifies those projects that USACE might participate in. Within Region H, only Bedias Reservoir might have received USACE funding if the scope of the project had been modified to include flood control. Also discussed were potential modifications to existing reservoirs to increase water supply yields (these modifications are generally limited to a 15% increase in storage). A saltwater barrier to improve water quality in the Brazos River was also identified as a potential project. USACE also has the ability to provide planning assistance to states for regional water supply studies, particularly studies crossing state and international boundaries.

Limitations to USACE assistance with water supply projects are (1) current policy preventing the USACE from participating in single–purpose water supply projects, (2) USACE's inability to share the cost of water supply projects, and (3) the time required to move appropriations actions through the federal government. The Texas Congressional Delegation could pursue changes to the governing regulations to allow participation in water supply projects, or could increase the percentage of water supply storage for future use allowed in USACE projects. However, USACE civil works projects are authorized individually by Congress. If the project sponsor desires USACE assistance, an exception permitting that assistance might be authorized in the same appropriation bill. The latter option requires the sponsor to have a project champion in Congress.

The Region H Water Planning Group recommends supporting regulatory changes that will allow USACE to increase water supply storage in new reservoirs which they construct and manage, and investigate other alternatives for increased involvement by USACE in funding water supply projects.

Region H supports the forming of regional facilities and encourages the State to remove any impediments to these entities, including restrictions to the use of public/private partnerships. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

As communities assess the growing costs of water infrastructure, economies of scale can be realized by combining the needs of water user groups into larger, more efficient water supply, treatment and distribution facilities. Regional facilities offer interconnections between existing systems, which can increase overall reliability. The individual system connections to these systems can be phased over time to meet regional demands with less impact on individual systems than each trying to individually expand. In areas where groundwater limits are being reached, regional groups can identify areas where surface water supply is most needed, and allow other areas to remain on groundwater systems. Sharing costs across a wide customer base keeps rates comparable between service areas.

A range of cooperative options exists, including formation of regional authorities, inter-local agreements, public-private partnerships, local government corporations and public contracting with a private regional supplier. The optimal arrangement between political subdivisions depends upon the specific project and the goals of the parties. Partnerships with private investors through public-private partnerships and direct contracting with privately-owned facilities offer an advantage of using private financing to meet part of the initial planning and construction costs. The regulations governing these partnerships must protect the public represented by the partnership, but if too restrictive, may prevent the partnership from realizing potential cost savings though the use of private-sector procurement and construction practices.

Consideration should be given to reducing procurement restrictions for Local Government Corporations to encourage the pooling of resources for funding regional projects. Also, existing assistance programs should remain available when political subdivisions enter into public/public or public/private partnerships.

The Region H Water Planning Group supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

Appendix 1A

Selected Bibliography by Topic

This Page Intentionally
Left Blank

Contents

This Page
Intentionally Left Blank

1A.1 Water Planning Reports

1A.1.1 State Water Plan

Water for Texas, 2002. Texas Water Development Board

Water for Texas: A Consensus-Based Update to the State Plan, 1997. Texas Water Development Board

Region H Water Plan, 2001. Brown & Root/Turner Collie & Braden

Region C Water Plan, 2001, Freese and Nichols

Brazos G Regional Water Plan, 2001, HDR Engineering

East Texas Regional Water Plan, 2001, Schaumberg and Polk

Lower Colorado Regional Water Plan, 2001, HDR Engineering

1A.1.2 Trans-Texas Water Program Reports

Contractual Transfers in the Southeast Area, 1998. Brown and Root

Desalinization, 1998. Brown and Root

Engineering Analysis of Interbasin Transfer Strategy 1998. Freese and Nichols

Environmental Analysis of Potential Transfer Routes, 1998. Freese and Nichols

Galveston Bay Freshwater Inflows Study, 1998. Brown and Root

Operation Studies and Opinions of Cost for Allens Creek Reservoir; Volumes I and II and Status of Environmental Issues for Allens Creek Reservoir, 1997. Freese and Nichols

System Operation of Surface Water Supply Sources in the Houston Area, 1997. Freese and Nichols

System Operation Study for Livingston / Wallisville and San Jacinto Basin for the Trans-Texas, September 1997. Freese and Nichols

Trans-Texas Water Program Southeast Area Phase I Report, March 1994. Brown and Root and Freese and Nichols

Trans-Texas Water Program Report, Planning Information Update, April 1996. Brown and Root and Freese and Nichols

Trans-Texas Water Program Southeast Area Phase II Report, April 1998. Brown and Root and Freese and Nichols

Wastewater Reclamation, 1998. Brown and Root

Water Conservation, 1998. Brown and Root

Water for Texas - A Consensus-Based Update to the Texas Water Plan, Volume II, Technical Planning Appendix, 1997, Texas Water Development Board

Water for Texas - Today and Tomorrow: A 1996 Consensus-based Update to the Texas Water Plan, Volume III, Water Use Planning Data Appendix, 1996, Water Demand/Drought Management Technical Advisory Committee of the Consensus-Based State Water Plan

1A.1.3 City / Agency Water Plans

City of Houston Final Water Conservation Plan, March 1997. Montgomery Watson

Cinco MUD No. 1 Water Supply and Wastewater Master Plan Update, 1997 Turner Collie & Braden Inc

Cinco Ranch Reclaimed Water Reuse Study, 1992 Turner Collie & Braden Inc.

Fairfield Village Regional Facilities Master Plan, 1993 Turner Collie & Braden Inc.

Feasibility Investigation of Allens Creek Reservoir, 1997, Turner, Collie and Braden, Inc. for the Fort Bend County Surface Water Supply Corporation

Feasibility Study, Interbasin Transfer, Sabine to San Jacinto, October 1988. Wayne Smith and Associates

Harris County UD 5 - Water and Wastewater Master Plan Investigation, 1994 Turner Collie & Braden Inc.

Long Range Water Supply Plan 1990 - 2050 to the City of Dallas, Texas, December 1989. Turner Collie & Braden

Preliminary Engineering Report for Modifications and Improvements to the Livingston Regional Water Supply System, 1991 Turner Collie & Braden Inc.

Regional Water Supply Plan for the Tarrant County Water Control and Improvement District Number One and the Texas Water Development Board, October 1990. Freese and Nichols and Alan Plummer and Associates

Regional Water Supply Planning Study, Fort Bend County, Texas, 1992. Turner Collie & Braden Inc. for Fort Bend Surface Water Supply Corporation

Regional Water Planning Study for the Harris-Galveston Coastal Subsidence District, 1991, update 1996, Turner Collie & Braden Inc.

Reservoir System Operation Plan for the City of Houston, May 1996. Montgomery Watson / Georgia A. Wilson & Associates

Review of the Water System Master Plan for the Bartonville Water Supply Corporation for Highland Shores, Inc.", 1991 Turner Collie & Braden Inc.

San Jacinto River Authority Water Resources Development Plan, Water Supply Plan, 1988. Pate Engineers

Trinity River Basin Master Plan, February 1989. Trinity River Authority of Texas

Water Conservation and Drought Contingency Plan for the Woodlands Planning Area, 1989 Turner Collie & Braden Inc.

Water and Wastewater Master Plan for Wood Trace, Montgomery County, 1991 Turner Collie & Braden Inc.

1A.1.4 Groundwater Management Plans

Bluebonnet Groundwater Conservation District Groundwater Management Plan, 2004

Fort Bend Subsidence District Groundwater Management Plan, 1998

Fort Bend Subsidence District 2003 Regulatory Plan

Harris-Galveston Coastal Subsidence District Groundwater Management Plan, 1998

Harris-Galveston Coastal Subsidence District, District Regulatory Plan, 2010

Lone Star Groundwater Conservation District Groundwater Management Plan, 2009

Mid-East Texas Groundwater Conservation District Management Plan, 2009

1A.1.5 Other Studies

Feasibility of Water Reuse (prepared for City of Houston), May 1992 Espey, Huston & Associates

Preliminary Feasibility Study, Interbasin Water Transfer from the Sabine River to the San Jacinto River Authority Service Area, November 1989. Freese and Nichols

Water Availability Model Selection and Project Management, ongoing, Parsons ES (in association with Turner Collie & Braden Inc. and Sarma)

Yield Analysis and Cost Estimate for Allens Creek Reservoir, (prepared for BRA), 1989. Freese and Nichols

An Analysis of Water Loss as Reported by Public Water Suppliers in Texas, January 2007. Alan Plummer Associates, Inc

1A.2 Surface Water Studies and Reports

1A.2.1 Water Availability Models

Neches River Basin, 2000, Brown & Root, Freese & Nichols, Espey Consulting and Crespo Consulting, 2000

Sabine River Basin, Brown & Root, Freese & Nichols, R.J. Brandes and Crespo Consulting, 2001

Trinity – San Jacinto River Basins, Espey Consulting, Brown & Root, Freese & Nichols, Crespo Consulting and GSG, Inc., 2001

Brazos River Basin, HDR Engineering, 2004

1A.2.2 US Geologic Survey Reports

Analysis of Minimum 7-Day Discharges and Estimation of Minimum 7-Day, 2-Year Discharges for Streamflow-Gaging Stations in the Brazos River Basin, Texas; T.H. Raines and W.H. Asquith, 1997

Documented and Potential Extreme Peak Discharges and Relation Between Potential Extreme Peak Discharges and Probable Maximum Flood Peak Discharges in Texas; By W.H. Asquith and R.M. Slade, Jr. , 1995

Floods in Central Texas, December 1991; By H.R. Hejl, Jr., R.M. Slade, Jr., and M.E. Jennings, 1995

Index of Stations-Surface-Water Data-Collection Network of Texas, September 1993; S.C. Gandara and R.E. Jones, 1995

Index of Stations-Surface-Water Data-Collection Network of Texas, September 1995; Compiled by S.C. Gandara and R.E. Jones, 1996

Peak Data for U.S. Geological Survey Gaging Stations, Texas Network; and Computer Program to Estimate Peak-Streamflow Frequency; By R.M. Slade, Jr., and W.H. Asquith, 1996

Regional Equations for Estimation of Peak-Streamflow Frequency for Natural Basins in Texas; By William H. Asquith and Raymond M. Slade, Jr, 1996.

Stratigraphic Nomenclature and Geologic Sections of the Gulf Coastal Plain of Texas; E.T. Baker, Jr., 1994

Streamflow to the Gulf of Mexico; By L.J. Judd, 1995

Streamflow Analysis of the Apalachicola, Pearl, Trinity, and Nueces River Basins, Southeastern United States; By K.E. Greene and R.M. Slade, Jr. , 1995

Summary of Surface-Water Hydrologic Data for the Houston Metropolitan Area, Texas, Water Years 1964-89; Fred Liscum, D.W. Brown\x13and\x13Mark C. Kasmarek, 1996

Techniques to Estimate Generalized Skew Coefficients of Annual Peak Streamflow for Natural Basins in Texas; By L.J. Judd, W.H. Asquith, and R.M. Slade, Jr. , 1996

Topographic Data Sets for Texas by River Basin; L.L. Tan, 1997

Water-Quality Assessment of the Trinity River Basin, Texas-Pesticides in a Coastal Prairie Agricultural Area, 1994-95; By M.F. Brown, 1996

1A.2.3 Other Studies

Bon Weir Project, 1990 Bureau of Reclamation

Lake Livingston Project, Lake Livingston, Texas Area and Capacity Tables, December 1991. Bureau of Reclamation

Proposed Allens Creek Reservoir Feasibility Study, 1998 Turner Collie & Braden Inc.

Reconnaissance report: Local flood protection: Little Fossil Creek- Haltom City, Texas, 1972, U.S. Army Engineer District, Fort Worth.

Trinity River & Tributaries -Wallisville Lake Non-Overflow Dam, 1985. U. S. Army Corps of Engineers

Trinity River Yield Study, Phase I, II, & III, 1983. Espey, Huston & Associates

1A.3 Groundwater Studies and Reports

1A.3.1 US Geological Survey Reports

Approximate Land-Surface Subsidence in Fort Bend County, Texas, 1943-87 and 1973-87; By R.K. Gabrysch and L.S. Coplin, 1998

Estimated Depth to the Water Table and Estimated Rate of Recharge in Outcrops of the Chicot and Evangeline Aquifers near Houston, Texas; By J.E. Noble, P.W. Bush, M.C. Kasmarek, and D.L. Barbie, 1996

Ground-Water Resources of the Houston District, Texas, 1944; By W.N. White, N.A. Rose, and W.F. Guyton

Water-Level Altitudes 1998, Water-Level Changes 1977-98 and 1997-98, and Compaction 1973-97 in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas; By L.S. Coplin, 1998

Water-Level Altitudes 1998 and Water-Level Changes 1990-98 and 1997-98 in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas; By L.S. Coplin and Horacio X. Santos, 1998

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Houston-Galveston Region, Texas, January-February 1992, 1993, and 1994; by M.C. Kasmarek, 1997

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas, January-February 1992, 1993, and 1994; by M.C. Kasmarek, 1997

Water-Level Altitudes in Wells Completed in the Chicot and Evangeline Aquifers, Fort Bend County and Adjacent Areas, Texas, January-February 1990; by M.C. Kasmarek, 1997

Report 82-431 Ground-Water Withdrawals and Changes in Water Levels in the Houston District, Texas 1975-1979, August 1982; By R. K. Gabrysch

Report 82-571 Ground-Water Withdrawals and Land-Surface Subsidence in the Houston-Galveston Region, Texas 1906-1980, 1982; By R. K. Gabrysch

Report 86-57 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1980-1984, 1986; By James F. Williams III, L.S. Coplin, C.E. Ranzau, Jr. and W.B. Lind

Report 88-4154 Flow Pattern in Regional Aquifers and Flow Relations Between the Lower Colorado River Valley and Regional Aquifers in Six Counties in Southeastern Texas, 1989; By Dennis G. Woodward

Report 90-4012 Ground-Water Withdrawals, Water-Level Changes, Land-Surface Subsidence, and Ground-Water Quality in Fort Bend County, Texas 1969-1987, 1990; By Glenn L. Locke

Report 90-588 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1985-1989, 1991; By Glenn L. Locke

Report 90-594 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1985-1989, 1991; By Glenn L. Locke

Report 90-598 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Harris and Galveston Counties, Texas, 1984-1989, 1991; By L.S. Coplin and Al Campodonico

Report 92-4180 Ground-Water Withdrawals, Water Levels, and Ground-Water Quality in the Houston District, Texas, With Emphasis on 1985-1989, 1993; By Dana L. Barbie and Glenn L. Locke

Report 96-4018 Estimated Depth to the Water Table and Estimated Rate of Recharge in Outcrops of the Chicot and Evangeline Aquifers Near Houston, Texas, 1996; By J. E. Noble, P.W. Bush, M. C. Kasmarek. and D.L. Barbie

1A.3.2 Texas Water Development Board Reports

Report 41 Ground Water in the Flood-Plain Alluvium of the Brazos River, Whitney Dam to Vicinity of Richmond, Texas, March 1967; By James G. Cronin and Clyde A. Wilson

Report 68 Ground-Water Resources of Austin and Waller Counties, Texas, December 1967; By Clyde A. Wilson

Report 72 Ground-Water Resources of Liberty County, Texas, April 1968; By R.B. Anders, G.D. McAdoo, and W.H. Alexander, Jr.

Report 80 Ground-Water Resources of San Jacinto County, Texas, August 1968; By W.M. Sandeen

Report 123 Records of Water-Level Measurements in Wells in Galveston County, Texas, December 1970; By R.K. Gabrysch, Gene D. McAdoo, and C.W. Bonnett

Report 133 Ground-Water Resources of Chambers and Jefferson Counties, Texas August 1971; By Saul Aronow

Report 136 Ground-Water Resources of Montgomery County, Texas, November 1971; By Barney P. Popkin

Report 139 Records of Wells, Drillers' Logs, and Chemical Analyses of Ground Water in Galveston County, Texas, December 1971; By R.K. Gabrysch, Gene D. McAdoo and W. L. Naftel

Report 152 Development of Ground Water in the Houston District, Texas, 1966-1969, June 1972; By R.K. Gabrysch

Report 155 Ground-Water Resources in Fort Bend County, Texas, August 1972; By J. B. Wesselman

Report 163 Ground-Water Resources of Brazoria County, Texas, February 1973; By William M. Sandeen and John B. Wesselman

Report 178 Ground-Water Data for Harris County, Texas Volume II, Records of Wells 1892-1972, January 1974; By R.K. Gabrysch, W. L. Naftel, Gene D. McAdoo and C.W. Bonnett

Report 201 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1966-1974, March 1976; By W. L Naftel, Kenneth Vaught, and Bobbie Fleming

Report 202 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1966-1974, March 1976; By W. L Naftel, Bobbie Fleming, and Kenneth Vaught

Report 238 Groundwater Availability in Texas, Estimates and Projections through 2030, September 1979

LP-103 A Digital Model for Simulation of Ground-Water Hydrology in the Houston Area, Texas , 1979; By Walter R. Meyer and Jerry E. Carr

Report 241 Development of Ground Water in the Houston District, Texas 1970-1974, January 1980; By R. K. Gabrysch

Report 277 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Brazoria, Fort Bend, and Waller Counties, Texas, 1975-1979, July 1983; By Karl W. Ratzlaff, C.E. Ranzau, and W.B. Lind

Report 280 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Chambers, Liberty, and Montgomery Counties, Texas, 1975-1979, September 1983; By Karl W. Ratzlaff, C.E. Ranzau, and W.B. Lind

Report 285 Records of Wells, Drillers' Logs, Water-Level Measurements, and Chemical Analyses of Ground Water in Harris and Galveston Counties, Texas, 1975-1979, March 1984; By Karl W. Ratzlaff, C.W. Bonnet, and L.S. Coplin

Report 289 Digital Models for Simulation of Ground-Water Hydrology of the Chicot and Evangeline Aquifers along the Gulf Coast of Texas, May 1985; By Jerry E. Carr, Walter R. Meyer, William M. Sandeen, and Ivy R. McLane

Report 295 Hydrology of the Jasper Aquifer in the Southeast Texas Coastal Plain, October 1986; By E. T. Baker, Jr.

Report 309 Ground-Water Conditions in Texas, 1980-1985, October 1988; Compiled By Ground Water Unit

Report 332 Ground-Water Resources of the Carrizo-Wilcox Aquifer in the Central Texas Region, September 1991; By David Thorkildsen and Robert D. Price

1A.3.3 Texas Groundwater Protection Committee Publications

Joint Groundwater Monitoring and Contamination Report - 1996; TNRCC Publication Number SFR-56, June 1997.

Activities of the Texas Groundwater Protection Committee, Report to the 75th Legislature; TNRCC Publication Number SFR-47, December 1996.

Texas Groundwater Program Directory; TNRCC Publication Number GI-226, October 1996.

Texas Ground-Water Data Dictionary; TNRCC Publication Number AS-109, August, 1996.

Joint Groundwater Monitoring and Contamination Report - 1995; TNRCC Publication Number SFR-36, April 1996.

Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater; Draft TNRCC Publication, March 1996.

Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater (Educational Brochure); TNRCC Publication Number GI-141, June 1995.

Joint Groundwater Monitoring and Contamination Report - 1994; TNRCC Publication Number SFR-20, April 1995.

Activities of the Texas Groundwater Protection Committee, Report to the 74th Legislature; TNRCC Publication Number SFR-14, December 1994.

Texas Groundwater Protection (Educational Brochure); Texas Natural Resource Conservation Commission (TNRCC) Publication Number GI-88, November 1994.

Joint Groundwater Monitoring and Contamination Report - 1993; Texas Natural Resource Conservation Commission Report SFR-6, May 1994.

Joint Groundwater Monitoring and Contamination Report - 1992; Texas Natural Resource Conservation Commission Report SFR-1, November 1993.

Activities of the Texas Groundwater Protection Committee, Report to the 73rd Legislature; Texas Water Commission Report R 93-01, January 1993.

Joint Groundwater Monitoring and Contamination Report - 1991; Texas Water Commission Report R 92-02, May 1992.

Texas Ground Water Protection Profiles; unpublished Texas Water Commission Report, June 1991.

Texas State Management Plan for Agricultural Chemicals in Ground Water; Agricultural Chemicals Subcommittee, June 1991.

Joint Groundwater Monitoring and Contamination Report - 1990; Texas Water Commission Report Z-104, April 1991.

Activities of the Texas Groundwater Protection Committee, Report to the 72nd Legislature; Texas Water Commission Report Z-96, January 1991.

Joint Groundwater Monitoring and Contamination Report; Texas Water Commission Report Z-94, April 1990.

Groundwater Protection Committee (GPC), Texas Groundwater Protection Strategy; TWC Report Z-80, January 1988.

Texas Ground Water Protection Activities - 1986; Texas Water Commission (TWC) Report Z-79, October 1986.

1A.3.4 Texas Board of Water Engineers

Ground-Water Resources of Brazoria County, Texas, November 1947; By C.R. Follett

Ground-Water Resources of Liberty County, Texas, 1950; By W. H. Alexander, Jr.

1A.3.5 Texas Water Commission

Availability and Quality of Ground Water in Leon County, Texas, May 1965; By Richard C. Peckham, Bulletin 6513

Ground Water Protection and Management Strategies for Fort Bend County, March 1990; By John Austin Williamson

1A.3.6 Other

Brackish Groundwater Manual for Texas Water Planning Groups, 2003. LBG-Guyton Associates

Managing Texas' Groundwater Resources Through Groundwater Conservation Districts, November, 1998, By Guy Fipps. Texas A&M System, Texas Agricultural Extension Service, B-1612/11-98.

1A.4 Agricultural Studies and Reports

Water Use and Management in the Texas Rice Belt Region, 1984, Ronal C. Griffin, Gregory M. Perry and Garry N. McCauley

Potential Rice Irrigation Water Conservation Measures, Water Planning Group - Region H, James A. Stansel, Texas A&M University System, July 2000

1A.5 Environmental and Water Quality Reports

1A.5.1 Texas Commission on Environmental Quality Reports

1996 Regional Assessment of Water Quality; Brazos River Basin including the Oyster Creek Watershed, 1996 Brazos River Authority

1996 Regional Assessment of Water Quality, 1996, Harris-Galveston Area Council of Governments

1996 Regional Assessment of Water Quality, 1996, Trinity River Authority of Texas

Assessment of Water Quality and Fish Kills in Upper Oyster Creek Segment 1245 (SR 92-05), 1992, TNRCC

State of Texas 1996 Water Quality Assessment, Texas Natural Resources Conservation Commission, 1997

Texas Water Quality Inventory 2000, TCEQ, April 2002

Waste Load Evaluation for Dissolved Oxygen in the Intracoastal Waterway in the Neches-Trinity Coastal Basin, Segment 0702. TNRCC, 1993.

1A.5.2 Texas Parks and Wildlife Department Reports

Wildlife Habitat Appraisal for the Proposed Allens Creek Reservoir Site. Lovelace et al., 1995. University of Houston Clear Lake.

A Fisheries Inventory and Assessment of Allens Creek and the Brazos River, Austin County, Texas. Linam et al., 1994. Resource Protection Division, Texas Parks & Wildlife Department, Final Report to TWDB, Research and Planning Fund Contract No. 93-483-364.

Status of Environmental Issues for Allens Creek Reservoir. Paul Price & Associates, 1996. Trans-Texas Water Program, Southeast Area Memorandum Report to the TWDB.

Macroinvertebrate Assessment of Allens Creek and the Brazos River, Austin County, Texas. Wood et al., Department of Biology-Aquatic Station, Southwest Texas State University, San Marcos, Texas, 1994. Final Report submitted to Texas Parks & Wildlife Department, for TWDB Research and Planning Fund Contract No. 93-483-364.

Utilization of Marsh and Associated Habitats along a Salinity Gradient in the Galveston Bay. Zimmerman et al., National Marine Fisheries Service, U.S. Department of Commerce, 1990. Technical Memorandum NMFS-SEFC-250.

Planning Report/Final Environmental Statement for the San Jacinto Project, Texas. U.S. Bureau of Reclamation, 1988.

Ecologically Significant River and Stream Segments of Region H, Regional Water Planning Area, Chad W. Norris and Gordon W. Linam, TPWD, October 1999.

1A.5.3 US Geological Survey Reports

Water Resources Data-Texas Volume 3, 1998-2003; US Geological Survey

Nutrient Loading and Selected Water-Quality and Biological Characteristics of Dickinson Bayou Near Houston, Texas, 1995-97; J.W. East, E.M. Paul, and S.D. Porter, 1998

Water-Quality Assessment of the Trinity River Basin, Texas-Nutrients and Pesticides in the Watersheds of Richland and Chambers Creeks, 1993-95; L.F. Land, 1997

Light Attenuation in a Shallow, Turbid Reservoir, Lake Houston, Texas; By Roger W. Lee and Walter Rast, 1997

Occurrence and Distribution of Organochlorine Compounds in Biological Tissue and Bed Sediment From Streams in the Trinity River Basin, Texas, 1992-93; J. Bruce Moring, 1997

Water-Quality Assessment of the Trinity River Basin, Texas-Pesticides in Streams Draining an Urban and an Agricultural Area, 1993-95; L.F. Land and M.F. Brown, 1996

Trends in Nutrient Inflows to the Gulf of Mexico from Streams Draining the Conterminous United States, 1972-93; By David D. Dunn, 1996

Water-Quality Assessment of the Trinity River Basin, Texas-Nutrients in Streams Draining an Agricultural and an Urban Area, 1993-95; By L.F. Land and A.A. Shipp, 1996

Summary Statistics and Graphical Comparisons of Specific Conductance, Temperature, and Dissolved Oxygen Data, Buffalo Bayou, Houston, Texas, April 1986-March 1991; By D.W. Brown and E.M. Paul, 1995

1A.5.4 Reports from Other Agencies

1998 Annual Water Quality Report, Brazos River Authority, 1998

Certified Report of Water Quality Management Study for Lower Oyster Creek, 1983, Espey, Huston & Associates

Characterization of non-point sources and loadings to Galveston Bay; Charles J. Newell, Hanadi S. Rifai, Philip B. Bedient. PUB/DATE: Galveston Bay National Estuary Program, 1992.

Environmental impact statement: Limestone electric generating station and Jewett mine in Freestone, Limestone, and Leon counties, Texas; U.S. Environmental Protection Agency, Region 6 ; prepared in cooperation with U.S. Soil Conservation Service, Texas Railroad Commission, Texas Historical Commission, Texas Dept. of Water Resources, Texas Air Control Board, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, and U.S. Dept. of Interior Office of Surface Mining. PUB/DATE Dallas, TX: The Agency, 1981.

Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determination of Needs. Longley (ed.), TWDB and TPWD, 1994.

Freshwater Inflow Recommendation for the Trinity-San Jacinto Estuary. Texas Parks & Wildlife Department, Coastal Studies Program, Austin, Texas, 1998.

Guidelines for Water Resources Permitting: Nutrient Requirements for Maintenance of Galveston Bay Productivity. Brock et al. Final TWDB Report to Near Coastal Waters Program, U.S. EPA, Region 6, 1996.

Lake Livingston 1991 Sedimentation Survey, 1992, Bureau of Reclamation

Potential Aquatic Ecological Impacts of Interbasin Water Transfers in the Southeast, West-Central, and South-Central Study Areas. Geo-Marine, Inc., Plano, Texas, 1995. Report Prepared for TWDB and U.S. Army Corps of Engineers, Fort Worth District, Contract No. DACA63-93-D-0014.

Regulatory effectiveness study for the Armand Bayou Coastal Preserve; Gary Mitchell and Duane Windsor. PUB/DATE: Galveston Bay National Estuary Program, 1991.

Regulatory effectiveness study for the Christmas Bay Coastal Preserve; Gary Mitchell. PUB/DATE: Galveston Bay National Estuary Program, 1991.

Segmentation development for Galveston Bay; prepared by Jones and Neuse, Inc., Environmental and Engineering Services. Galveston Bay National Estuary Program, 1992.

Toxic contaminant characterization of aquatic organisms in Galveston Bay: a pilot study; prepared by James M. Brooks, et al. PUB/DATE: Galveston Bay National Estuary Program, 1992.

Trinity River Basin Regional Assessment of Water Quality, Trinity River Authority, 1996

Trinity River & tributaries: regional environmental impact statement; US Army Corps of Engineers, Fort Worth District. PUB/DATE Fort Worth, TX: The District, 1987.

Trinity-San Jacinto Estuary: A Study of the Influence of Freshwater Inflows. Texas Department of Water Resources (now TWDB), 1981. Report No. LP-113

1A.6 Recreational and Navigational Water Use Reports

1A.6.1 Stream Flow Information

McKinney, Larry, et al. "Freshwater Inflow Recommendation For the Trinity - San Jacinto Estuary of Texas." Coastal Studies Program, Resource Protection Division, Texas Parks & Wildlife Department; Austin, TX, March 1998.

Texas River Recreation Advisory, June 1999

http://twister.sbs.ohoi-state.edu/text/wxascii/rivercond/FGUS44.KFWD

Brazos River Basin Water Supply Reservoir Data, Brazos River Authority, June 1999

http://www.brazos.org/wrd/water%20supply%20data.htm

Freshwater Inflows to Texas Bays and Estuaries-Ecological Relationships and Methods for Determination of Needs, Texas Parks & Wildlife Department, November 1998

http://www.tpwd.state.tx.us/conserve/sb1/enviro/envwaterneeds/envwaterneeds.html

Galveston Bay/Trinity and San Jacinto Estuary Draft Report, Texas Parks & Wildlife Department, October 1998

http://www.tpwd.state.tx.us/conserve/sb1/enviro/galvestonbay-trinitysanjac/ inlandflow.html

Freshwater Inflows to Texas Bays and Estuaries-Ecological Relationships and Methods for Determination of Needs, Texas Parks & Wildlife Department, December 1998

www.tpwd.state.tx.us/conserve/sb1/enviro/freshwaterinflows/freshwaterinflows.html

Reservoir Conditions for selected River Basins in Texas, USGS, September 1999

tx.usgs.gov/nwis-bin/current?type=lake&group=basin&search=

Ft Worth District Reservoir Release Report, USACE, September 1999

www.swf-wc.usace.army.mil/reports/fish.htm

CanoeTX webpage, Texas River Recreation Association, flows compiled in 1972

http://world.std.com/`reichert/canoeTX.htm

Brown & Root, Inc. Trans-Texas Water Program: Southeast Area, Technical Memoranda CD, 1997

Brown & Root, Inc. Trans-Texas Water Program Reports CD, May 1998

1A.6.2 River/River Basin Information

Texas Natural Resource Conservation Commission, The State of Texas Water Quality Inventory: Surface Water Quality Monitoring Program. TNRCC, Austin, TX; Volume 1-4, December 1996.

Texas Clean Rivers Program & TNRCC, Texas Water Quality: A Summary of River Basin Assessments. TNRCC, Austin, TX; December 1996.

Jack Bauer, et al, A Natural Resource Survey For Proposed Reservoir Sites And Selected Stream Segments In Texas. Texas Parks & Wildlife Department, Austin, TX; Contract Study: Number 1; Part 1, August 1991.

San Jacinto River Authority, June 1999 www.neosoft.com/~mtaylor/sjra.htm

Trinity River Authority of Texas, June 1999 trinityra.org/masterplan/masterplan.htm

Brazos River Authority Home Page, June 1999 www.brazos.org/home.htm

East Texas Seasonal and Restrictive Waterways, page 1, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_08.htm

East Texas Seasonal and Restrictive Waterways, page 2, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways /e_tx_09.htm#navasota-river

Table of Contents: Analysis of Texas Waterways, Texas Parks & Wildlife Department, February 1999www.tpwd.state.tx.us/conserve/sb1/econom/waterways/ waterways_toc.htm

East Texas Waterways: Trinity River, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_06.htm

East Texas Waterways: San Jacinto River-West Fork, Sulphur River, Trinity River-Elm Fork, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_05.htm

East Texas Waterways: Pine Island Bayou, Red River, Sabine River, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_04.htm

East Texas Waterways: Neches River, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_03.htm#neches

East Texas Waterways: Brazos River, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/sb1/econom/waterways/e_tx_02.htm#brazos-river

Table 6.1. Present Texas Natural Resource Conservation Commission Water Quality Segments, Designated Uses, and Standards in the Galveston Bay System, June 1995 http://www.rice.edu/armadillo/Galveston/Chap6/table6a1.html

1A.6.3 Navigation

Trinity River Basin Navigation, January 1998 trinityra.org/masterplan/navigat.htm

Navigation Information Connection, June 1999 www.mrr.usace.army.mil/hic.htm

Tide Predictions for Galveston, Galveston Channel, TX, NOAA/National Ocean Service, October 1999 http://www.opsd.nos.noaa.gov/tides/gulfGAL.html

Tidal Datums Procedure- Galveston Update, NOAA/National Ocean Service, July 1998 http://www.opsd.nos.noaa.gov/galv_dtm.html

NOAA, Physical Oceanographic Real- Time Systems, March 1999 http://www.opsd.nos.noaa.gov/hgports/hgports.html

The Gulf Intracoastal Waterway in Texas, Texas Department of Transportation, 2002

The Texas Transportation Plan Update, Marine Transportation, Cambridge Systematics, October 2002

The Handbook of Texas Online, Texas State Historical Association, DEC 2002, www.tsha.utexas.edu/handbook/online

1A.6.4 Recreational Areas/Activities

Galveston Bay National Estuary Program, "Galveston Bay Recreational User's Handbook." Galveston Bay National Estuary Program; May 1992.

Ramos, Mary G., 1998-1999 Texas Almanac and State Industrial Guide. The Dallas Morning News, Dallas, TX; 1997.

The Roads of Texas. Shearer Publishing, Fredericksburg, Texas; 1988.

"The Great Texas Coastal Birding Trail: Upper Texas Coast." TPWD, Austin, TX; 1999. (Map)

Ducks Unlimited Texas, February 1998 www.ducks.org/7x/states/texas.htm

Search Fishbase, July 1999 www.ccgiar.org/ICLARM/fishbase/search.cfm

Brazoria County, July 1999 www.travelingtexas.com/brazoriaco.html

Southern Brazoria County Visitors and Convention Bureau, July 1999 www.tourist-ino.org/

Chambers County, Texas – Attractions, April 1998 co.chambers.tx.us/tourism/attracts.html#Bird Watching

Attractions –Lake Conroe, June 1999 www.chamber.montgomery.tx.us/lake_conroe/non-frames/attractions.htm

Fort Bend County community activities, 1998 www.fortbend.org/activities/index.htm

Wallisville Lake Project, June 1996 www.neosoft.com/~mtaylor/news/news6.htm#lake

Trinity River Basin Recreation, January 1998 trinityra.org/masterplan/saltintr.htm

Central Regional Wastewater System –Livingston Recreation Facilities, November 1998 www.trintyra.org/pubserve/livrec.htm

Recreation, Brazos River Authority Lakes, September 1999 www.brazos.org/r&p/recreation.htm

National Marine Fisheries Service –Estuary Selections, 1998 galveston.ssp.nmfs.gov/efh/estuaries.asp

South Central States Park Detail, June 1999 www.usace.army.mil/inet/functions/cw/cecwo/scdet.htm#Texas

USDA Forest Service, September 1999 www.fs.fed.us/

Galveston Bay Estuary Program –Recreational Uses, June 1999 riceinfo.rice.edu/armadillo/Galveston/Chap4/rec.html

Galveston Bay Estuary Program –Boating, June 1999 riceinfo.rice.edu/armadillo/Galveston/Chap4/boating.html

Galveston Bay Estuary Program –Sport Fishing, June 1999 riceinfo.rice.edu/armadillo/Galveston/Chap4/sport.html

Galveston Bay Estuary Program –Recreational Uses Map, June 1999 riceinfo.rice.edu/armadillo/Galveston/Chap4/fig4a12.html

Galveston Bay Estuary Program –Table 4.9. Licensed Fisherman by Fiscal Year, June 1999 riceinfo.rice.edu/armadillo/Galveston/Chap4/tab4a9.htm

Recreation.Gov –Addicks Dam, June 1999 www.recreation.gov/detail.cfm?ID=517

Recreation.Gov –Barker Dam, June 1999 www.recreation.gov/detail.cfm?ID=519

Recreation.Gov –Wallisville Reservoir, June 1999 www.recreation.gov/detail.cfm?ID=518

Recreation.Gov –Anahuac NWR, June 1999 www.recreation.gov/detail.cfm?ID=1262

Recreation.Gov –Attwater Prairie Chicken NWF, June 1999 www.recreation.gov/detail.cfm?ID=1281

Recreation.Gov –Brazoria NWR, June 1999 www.recreation.gov/detail.cfm?ID=1318

Recreation.Gov –San Bernard NWR, June 1999 www.recreation.gov/detail.cfm?ID=1593

Recreation.Gov –National Forests in Texas: Angelina-Davy Crockett -Sabine -Sam Houston National Forests, June 1999 www.recreation.gov/detail.cfm?ID=1049

U.S. Fish & Wildlife Service –Southwest Region –Texas Links, June 1999 southwest.fws.gov/statelinks/texaslinks.htm

Anahuac NWR, U.S. Fish & Wildlife Service, September 1999
southwest.fws.gov/refuges/texas/anahuac.html

Attwater Prairie Chicken NWR, September 1999 southwest.fws.gov/refuges/texas/apc.html

Brazoria NWR, U.S. Fish & Wildlife Service, September 1999
southwest.fws.gov/refuges/texas/brazoria.html

San Bernard NWR, U.S. Fish & Wildlife Service, September 1999
southwest.fws.gov/refuges/texas/sanber.html

Trinity River NWR, U.S. Fish & Wildlife Service, September 1999
southwest.fws.gov/refuges/texas/trinity.html

U.S. Fish & Wildlife Service –Texas Links, March 1998
sturgeon.irm1.r2.fws.gov:80/u2/refuges/texas/txlinks.html

NPS units in TX, National Park Service, September 1999 www.nps.gov.parklists/tx.html

National Parks Service –Visits by State 1997 N-Y, March 1999
www2.nature.nps.gov/stats/bystaten_y.html#TX

Big Thicket National Preserve, National Park Service, June 1999 www.nps.gov/bith/

Great Outdoor Recreation Pages Attractions, September 1999
www.gorp.com/gorp/resource/main.htm

GORP –U.S. National Parks and Preserves, September 1999
www.gorp.com/gorp/resource/us_national_park/main.htm

GORP –Big Thicket National Preserve, September 1999
www.gorp/resource/US_National_Park/tx_big_t.HTM

GORP –Texas National Forests, September 1999
www.gorp.com/gorp/resource/us_national_forest/tx.htm

GORP –Angelina, Davy Crockett, Sabine and Sam Houston National Forests, September 1999
www.gorp.com/gorp/resource/US_National_Forest/tx_texas.HTM

GORP –Davy Crockett National Forest –Four C National Recreation Trail, September 1999
www.gorp.com/gorp/resource/us_trail/tx_crock.htm

GORP –Texas National Wildlife Refuges/Marine Sanctuaries, September 1999
www.gorp.com/gorp/resource/us_nwr/tx.HTM

GORP –Anahuac National Wildlife Refuge, September 1999
www.gorp.com/gorp/resource/us_nwr/tx_anahu.htm

GORP –Attwater Prairie Chicken National Wildlife Refuge, September 1999
www.gorp.com/gorp/resource/us_mwr/tx_attwa.htm

GORP –Brazoria National Wildlife Refuge, September 1999
www.gorp.com/gorp/resource/us_nwr/tx_brazo.htm

GORP –San Bernard National Wildlife Refuge, September 1999
www.gorp.com/gorp/resource/us_nwr/tx_san_b.htm

GORP –U.S. Army Corps of Engineers –Texas Projects, September 1999
www.gorp.com/gorp/resource/us_nra/ace/tx.htm

GORP –Barker Dam –Texas Corps Projects, September 1999
www.gorp.com/gorp/resource/us_nra/ace/tx_bark.htm

US Department of Agriculture, US Forest Service, Recreation Areas, June 1999
www.r8web.com/texas/recreati.htm

1999-2000 Wildlife and Recreation Information –Hunting, September 1999
www.r8web.com/texas/hunting_99_2000.htm

Sam Houston National Forest Map, September 1999
www.r8web.com/texas/images/maps/samhouston.jpg

Alphabetical Listing of State Parks, Texas Parks & Wildlife Department, August 1999
www.tpwd.state.tx.us/park/parklist.htm

Brazos Bend State Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/brazos/brazos.htm#activities

Galveston Island State Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/galvesto/galvesto.htm

Huntsville State Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/huntsvil/huntsvil.htm

Lake Houston State Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/lakehous/lakehous.htm

Lake Livingston State Park, Texas Parks & Wildlife Department, March 1999
www.tpwd.state.tx.us/park/lakelivi/lakelivi.htm

San Jacinto Battleground State Historical Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/battlesh/battlesh.htm

Sheldon Lake State Park and Wildlife Management Area, Texas Parks & Wildlife Department, February 1998 www.tpwd.state.tx.us/park/sheldon/sheldon.htm

Stephen F. Austin State Historical Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/sfa/sfa.htm

Varner Hogg State Historical Park, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/park/varner/varner.htm

Wildlife Management Areas, Texas Parks & Wildlife Department, October 1998
www.tpwd.state.tx.us/wma/index.htm

Alphabetical Listing of Wildlife Management Areas, Texas Parks & Wildlife Department, August 1999
www.tpwd.state.tx.us/wma/wmalist.htm

WMA Recreational Opportunities Form –Candy Abshier, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/wma/wmarea/abshier.htm#text

WMA Recreational Opportunities Form –Atkinson Island, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/wma/wmarea/atkinson.htm#text

WMA Recreational Opportunities Form –Sam Houston National Forest, Texas Parks & Wildlife Department, September 1999www.tpwd.state.tx.us/wma/wmarea/ samhouston.htm#text

WMA Recreational Opportunities Form –Keechi Creek, Texas Parks & Wildlife Department, August 1999 www.tpwd.state.tx.us/wma/wmarea/keechi.htm#text

WMA Recreational Opportunities Form –Peach Point, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/wma/wmarea/peachpnt.htm#recreation

Texas Fishing –The Official Page, Texas Parks & Wildlife Department, June 1999
www.tpwd.state.tx.us/fish/fish.htm

Freshwater Fish ID, Texas Parks & Wildlife Department, June 1999
www.tpwd.state.tx.us/fish/infish/species/fishgrup.htm

Alphabetical Listing of Texas Lakes, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/listing.htm

Lake Conroe –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/conroe/lake_id.htm

Lake Conroe Point A –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/conroe/access/pointa.htm

Lake Conroe Point B –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/conroe/access/pointb.htm

Lake Conroe Point D –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/conroe/access/pointd.htm

Lake Conroe Point G –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/conroe/access/pointg.htm

Lake Houston –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/lake_id.htm

Lake Houston Point A –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointa.htm

Lake Houston Point B –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointb.htm

Lake Houston Point C –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointc.htm

Lake Houston Point D –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointd.htm

Lake Houston Point E –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointe.htm

Lake Houston Point F –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/houston/access/pointf.htm

Lake Limestone –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/limeston/lake_id.htm

Lake Limestone Point A –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/limeston/access/pointa.htm

Lake Limestone Point B –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/limeston/access/pointb.htm

Lake Limestone Point C –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/limeston/access/pointc.htm

Lake Limestone Point D –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/limeston/access/pointd.htm

Lake Livingston –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/aleks/living/lake_id.htm

Lake Livingston Point B –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointb.htm

Lake Livingston Point M –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointm.htm

Lake Livingston Point V –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointv.htm

Lake Livingston Point Y –Fishing, Texas Parks & Wildlife Department, September 1999
www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointy.htm

Lake Livingston Point aa –Fishing, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointaa.htm

Lake Livingston Point gg –Fishing, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/fish/infish/lakes/living/access/pointgg.htm

Related Sites –TPW, Texas Parks & Wildlife Department, September 1999 www.tpwd.state.tx.us/admin/hot/hotlinks.htm

TX GEMS, Texas Parks & Wildlife Department, November 1998 www.tpwd.state.tx.us/conserve/txgems/mapimage/mapimage.htm

GEMS- Chrsitmas Bay Coastal Preserve, Texas Parks & Wildlife Department, February 1999 www.tpwd.state.tx.us/conserve/txgems/christma/christma.htm

1A.6.5 Economics

Southwick Associates, “The Economic Contributions of Bird and Waterfowl Recreation in the United States During 1991.” International Association of Fish and Wildlife Agencies and the USFWS North American Waterfowl and Wetlands Office, March 1995.

Boat and Motor Dealer, “NMMA's latest statistics show 1998 marine industry market at a glance.” 1998 Retail Market Review, February 1999.

Allen, Michael. “Birding Trail Takes Aim At Affluent Eco-Tourists.” The Wall Street Journal, Texas Journal, August 31, 1994.

Kerlinger, Ph.D., Paul. “The Economic Impact of Birding Ecotoursim On Communities Surrounding Eight National Wildlife Refuges. ” 1993-1994.

“Nature Tourism in the Lone Star State: Economic Opportunities in Nature, A report from the State Task Force on Texas Nature Tourism.” TPWD and Texas Department of Commerce.

“Factsheet: Birding as an Economic Asset.” National Fish and Wildlife Foundation.

“Birds mean Business for America.” Ducks Unlimited and International Association of Fish and Wildlife Agencies.

Tveten, John and Gloria. “Birding trail boosts Texas’ ecotourism.” Houston Chronicle. February 4, 1996.

The Economic Importance of Sport Fishing, Recreation & Economics, TPWD, October 1998

http://www.tpwd.state.tx.us/conserce/sb1/econom/econsportfish/econsportfish.html

Economics.html, Texas-Sea-Grant, Texas A&M University, June 1999

http://texas-sea-grant.tamu.edu/economics.html

1A.7 Ecologically Unique Stream Segments, Unique Reservoir Sites and Legislative References

Brazos G Water Planning Group, 2001 Brazos G Regional Water Plan.

Bureau of Reclamation, Great Plains Region, November 1988, *Planning Report / Final Environmental Statement, San Jacinto Project, Texas*

Espey, Huston & Associates, Inc., 1986, *Trinity River Yield Study Phase III: Yield Analysis*.

Freese and Nichols, Inc., 1996, *Memorandum Report: Updated Water Project Opinions of Cost*.

Freese & Nichols, 1997, Trans-Texas Water Program Southeast Area, *Operation Studies and Opinions of Cost for Allens Creek Reservoir Volumes I and II.*

Metcalf & Eddy, 1991, *Houston Water Master Plan, Appendix L*

Norris, Chad W. and Gordon W. Linam, Texas Parks and Wildlife Department, October 1999, *Ecologically Significant River and Stream Segments of Region H, Regional Water Planning Area*.

Pate Engineers, Inc, 1988, San Jacinto River Authority, *Water Resources Development Plan-Water Supply Plan*.

Peterson, Dave, US Forest Service, 2003, *Boswell Creek Watershed, Healthy Forest Initiative, Specialist Report – Aquatics*.

Quesada, Felix, US Forest Service, 2003, *Boswell Creek Watershed, Healthy Forest Initiative, Wildlife Report*.

Texas Parks and Wildlife Dept. and U.S. Fish & Wildlife Service, 1990, *Texas Water and Wildlife: A Natural Resource Survey for Proposed Reservoir Sites and Selected Stream Segments in Texas*.

Texas Parks and Wildlife Department, *Ecologically Significant River and Stream Segments Reports*, updated October 2003, accessed at http://www.tpwd.state.tx.us/texaswater/sb1/rivers/unique/sigseg.phtml

Texas Parks and Wildlife Department, Texas Gulf Ecological Management Sites, Anahuac NWR data page, accessed at www.tpwd.state.tx.us/texaswater/txgems/anahuac/anahuac.phtml

1A.8 Water Infrastructure Financing References

1A.8.1 Self Financing Information

A Handbook for Board Members of Water Districts in Texas, Fourth Edition, *Sections on Taxation and Bonds only*, TNRCC Regulatory Guidance RG-238, June 1996

TNRCC Jurisdiction Over Utility Rates and Service Policies, TNRCC Regulatory Guidance RG-245, rev. July 2000

Texas Small Towns Environment Program (STEP), Guidelines for Community Self-Help Projects, The Rensselaerville Institute, 2001

Texas Small Towns Environment Program (STEP), Role of Government to Support Community Self-Help Projects, The Rensselaerville Institute, 2001

Texas Small Towns Environment Program (STEP), Sparkplugs…Leading Resident Volunteers Through Community Self-Help, The Rensselaerville Institute, 2001

1A.8.2 Government Loan and Grant Programs

2003 Drinking Water State Revolving Fund (DWSRF) Funding Opportunities for Public Drinking Water Projects & Source Water Protection Projects, TWDB Letter, November 15, 2001, with attachments

Agricultural Water Conservation Loan Program, summary information from the TWDB website, www.twdb.state.tx.us

Agricultural Water Conservation Program, Texas Administrative Code, Title 31, Chapter 367

Civil Works Programs, US Army Corps of Engineers, 2001 Report, *Introduction and Water Supply sections only*.

Clean Water State Revolving Fund, Texas Administrative Code, Title 31, Chapter 375

Economically Distressed Areas Program (EDAP), summary information from the TWDB website, www.twdb.state.tx.us *Two eligible counties in Region H, Leon and Liberty*

EDAP Status Report, TWDB, December 31, 2001

Funding Sources for Utilities, TNRCC Regulatory Guidance RG-220, rev. May 2001

Financial Assistance Programs, Texas Administrative Code, Title 31, Chapter 363

Research and Planning Funding, Texas Administrative Code, Title 31, Chapter 355

Water and Waste Disposal Programs, Fiscal Year 2001, USDA Rural Utilities Service, July 1, 2001

1A.8.3 Additional Reports

Clean Safe Water for the 21st Century, Water Infrastructure Network, April 2000

Drinking Water Infrastructure Needs Survey, Second Report to Congress, *Executive Summary and Appendices B, C and E only,* US EPA Report 814-R-01-004, February 2001

Funding America's Drinking Water Infrastructure: From Public to Private, Christina Brow, Washington Internships for Students of Engineering, 2001

Texas Water Allocation Assessment Report, prepared for the Fort Worth District, USACE by Freese and Nichols, Inc., March 2002

Water Infrastructure Now, Water Infrastructure Network, February 2001

Water Conservation Plans, Drought Contingency Plans, Guidelines and Requirements, Texas Administrative Codes, Title 30, Chapter 288

This Page Intentionally Left Blank

Contents

List of Tables

List of Figures

List of Appendices

Chapter 2 – Presentation of Population and Water Demands

2.1 Introduction

2.1.1 Scope of Work

This chapter presents the results of Task 2 of the project scope, which addresses updated population and water demand data for the region and outlines the guidelines and methodology used for the update. Also, to provide consistency and facilitate the compilation of the different regional plans, TWDB required the incorporation of this data into a standardized online database referred to as TWDB DB12. Tables that contain this information are identified below and are located at the end of this chapter.

Table 2-4 – Population by City, Collective Reporting Unit, Individual Retail Public Utility, and Rural County

Table 2-5 – Water Demand by City and Category

2.1.2 Background

Statewide estimates indicate that the population of Texas will nearly double by the year 2060, increasing from about 21 million in 2000 to more than 46 million people. According to the 2007 State Water Plan (SWP), 43 counties and 297 cities are projected to at least double their population by 2060. At present time, 2.8 million ac-ft/yr (AFY) of irrigation demands and 611,000 AFY of municipal demands would not be met if the historical drought of record (DOR) were to occur today. These identified shortages will obviously increase over time and could have substantial economic consequences if not adequately addressed.

Water resource planning and management in Texas is a shared responsibility of local utilities, regional special purpose districts, and state agencies. Local and regional water development authorities, as well as municipalities, have had primary responsibility for planning, developing, financing and constructing new water resources projects. The State’s primary historical role has been providing guidance, regulatory governance, and limited financial assistance when possible.

2.2 Methodology

2.2.1 General

A key task in the preparation of the water supply plan for Region H was to determine current and future water demands within the region. Projections of future water demands are compared with estimates of currently available water supply to identify future expected water shortages. The TWDB, the Texas Commission on Environmental Quality (TCEQ), the Texas Parks and Wildlife Department (TPWD), and the Texas Department of Agriculture (TDA) prepared population and water demand projections for all water user groups (WUGs) within Region H as part of the development process for the 2006 Region H Regional Water Plan (RWP). These projections were eventually incorporated into the 2007 State Water Plan (SWP).

For this planning cycle the TWDB determined that complete revisions of RWPs would not be required due to the lack of new population data from the U.S. Census Bureau. The new population projections were developed using a selective approach in conjunction with data from the Texas State Data Center (SDC) for 2007 on county and municipal population. This section discusses the guidelines and methodology used to evaluate and select projections for use in the RWP for Region H.

TWDB rules require that the analysis of current and future water demands be performed for each Water User Group (WUG) within Region H. To be considered a WUG within the municipal category, one of the following must apply:

A city with a population of 500 or more, per the Texas State Demographer's July 2005 population estimate

Individual utilities providing more than 280 AFY of water for municipal use in 2005 (for counties having four or less of these utilities)

Collective Reporting Units (CRUs) consisting of grouped utilities having a common association

All smaller communities and rural/incorporated areas of municipal water use, aggregated at the county level, are considered a WUG and are referred to as "County Other" for each county. Additionally, for each county the categories of irrigation, livestock, manufacturing, mining, and steam electric power generation water use are each considered a WUG.

Furthermore, TWDB rules require the determination of demands associated with each of the Wholesale Water Providers (WWPs) designated by the Region H Water Planning Group (RHWPG). Region H defines wholesale water providers as any persons or entities (including river authorities and irrigation districts) that have contracts to sell more than 1,000 acre-feet of wholesale water in any one year during the five years immediately preceding the adoption of the last RWP. The RHWPG will also include other persons and entities that enter or that the Planning Group expects or recommends to enter into contracts to sell more than 1,000 acre-feet of wholesale water during the period covered by the plan. Designated WWPs in the Region H area include:

Baytown Area Water Authority
Brazos River Authority
Brazosport Water Authority
Central Harris County Regional Water Authority (CHCRWA)
Chambers Liberty Counties Navigation District (CLCND)
City of Galveston
City of Houston
City of Huntsville
City of Missouri City
City of Pasadena
Cities of Richmond and Rosenberg
City of Sugar Land
Clear Lake City Water Authority
Dow Chemical Co.
Fort Bend County WCID No. 1
Fort Bend County WCID No. 2
Galveston County WCID No. 1
Gulf Coast Water Authority
La Porte Area Water Authority
Lower Neches Valley Authority
North Channel Water Authority
North Fort Bend Water Authority (NBFWA)
North Harris County Regional Water Authority (NHCRWA)

NRG
San Jacinto River Authority
Trinity River Authority
West Harris County Regional Water Authority (WHCRWA)

The following sections describe the methodology used to develop population projections for municipal areas and water demand for each municipal, irrigation, livestock, manufacturing, mining, and steam electric power generation WUG in Region H. After the revised population and water demand projections were approved by the RWPG and formally adopted by the TWDB, the projections were incorporated into the TWDB online database DB12.

2.2.2 TWDB Guidelines for Revisions to Population and Water Demand Projections

The TWDB established criteria and data requirements to be used in evaluating and developing revisions to the state census based and/or consensus-based population and water demand projections. The criteria applied in developing revisions to the draft TWDB projections for Region H are displayed in italic type below and are described in detail.

2.2.2.1 Population Projections

Population is the principal determinant for projected future municipal water demand when combined with estimates of per capita water use and water conservation assumptions. As such, emphasis has been placed on evaluating the State's draft population projections and on developing revisions in accordance with the following criteria.

County Level Population

During this planning round, no Guidance was provided by TWDB for altering County Level projections.

Sub County Population

The projected population growth throughout the planning period for the cities, utilities and rural area (County-Other) within a county is a function of a number of factors, including the entity's share of the county's growth between 1990 and 2000, as well as local information provided by Planning Groups.

Criteria: *One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the sub-county population projections:*

a. *The July 2005 State Demographer's population estimate is greater than the 2010 projected population of the city.*

b. *The population growth rate for a city, utility or County-Other over the most recent five years is substantially greater than the growth rate between 1990 and 2000.*

c. *Identification of areas that have been annexed by a city since the 2000 Census.*

d. *Identification of the expansion of a utility's CCN or service area since the last update by the TCEQ to the digital boundary data.*

e. *Identification of growth limitations or build out conditions in a city or utility that would result in maximum population that is less than was originally projected.*

Data Requirements: *The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any revisions to the sub-county-level population projections:*

1. *Population estimates for cities developed and published by the State Data Center or by a regional council of governments will be used to verify criteria (a) or (b) for cities.*

2. *The verified number of residential connections and permanent population served will be used to verify criteria (b) for utilities.*

3. *The estimated population of an area that has been annexed by a city (for criteria c) or has become part of a CCN or service area for a water utility (for criteria d). In addition, the geographical boundary of the area must be presented in acceptable map or ArcView shapefile.*

4. *Documentation from an official of a city or utility describing the conditions expected to limit population growth and estimating the maximum expected population will be used to verify criteria (e).*

5. *Other data that the Planning Group believes is important to justify any changes to the population projections.*

2.2.2.2 Municipal Water Use

Municipal water demand is defined as residential and commercial water demand. Residential demand includes single and multi-family residential household water demand. Commercial demand includes water demands of business establishments, public offices, and institutions, but does not include industrial water demand. Residential and commercial water demands are categorized together because they are similar types of demands, i.e., each category uses water primarily for drinking, cleaning, sanitation, cooling, and landscape watering. Reported municipal water use data for the year 2000 was used to calculate the base per capita water demand for each city. The municipal water demand projections shall incorporate anticipated future water savings due to the natural installation of plumbing fixtures to more water-efficient fixtures, as detailed in the 1991 State Water-Efficient Plumbing Act. All other future water savings due to conservation programs undertaken by cities, utilities or county-other will be classified as WMSs by the Planning Group.

Criteria: *One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the municipal water demand projections:*

a. *Any changes to the population projections for an entity will require revisions to the municipal water use projections.*

b. *Errors identified in the reporting of municipal water use for an entity.*

c. *Evidence that the year 2000 water use was abnormal due to temporary infrastructure constraints.*

d. Evidence that per capita water use from a year between 2000 2005 would be more appropriate because that year was more representative of below normal rainfall conditions.

e. Trends indicating that per capita water use for a city, utility or rural area of a county have increased over the latest period of analysis, beginning in 1995, and evidence that these trends will continue to rise in the short term future.

f. Evidence that the number of fixture installations to water efficient fixtures between 2000 and 2005 is different than the TWDB schedule.

Data Requirements: *The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any revisions to the municipal water use projections:*

1. *Annual municipal water production (total surface water diversions and/or groundwater pumpage and water purchased from other entities) for an entity measured in acre feet.*

2. *The volume of water sales by an entity to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre feet.*

3. *Net annual municipal water use, defined as total water production less sales to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre feet.*

4. *Documentation of temporary infrastructure constraints.*

5. *Drought index or growing season rainfall data to document a year different than 2000 as the dry year.*

6. *Documentation of the number of water efficient fixtures replaced between 2000 and 2005.*

7. *In order to verify increasing per capita water use trends for a city or rural area of a county and therefore revising projections of per capita water use to reflect this increasing trend, the following data must be provided with the request from the Planning Group:*

    1. *Historical per capita water use estimates based on net annual municipal water use for the city, utility or rural area of a county, beginning in 1995.*

    2. *A trend analysis which must take into account the variation in annual rainfall.*

    3. *Revised projections of per capita water use for a city, utility or rural area of a county will be submitted by the Planning Group, where an increasing trend in per capita water use has been verified for a city or rural area of a county.*

    4. *Growth data in the residential, commercial and/or public sectors that would justify an increase in per capita water use.*

8. *Other data the Planning Group believes is important to justify any revisions to the State Water Plan municipal water use projections.*

2.2.2.3 Industrial Water Use

Industrial water demand is defined as water used in the production process of manufactured products, steam-electric power generation, and mining activities, including water used by employees for drinking and sanitation purposes.

Criteria: *One or more of the following criteria must be verified by Planning Group and the Executive Administrator for consideration of revising the industrial water demand projections:*

a. An industrial facility which has recently located in a county and may not have been included in the Board's database. Documentation and analysis must be provided that justify that the new industrial facility will increase the future industrial water demand for the county above the industrial water use projections.

b. An industrial facility has recently closed its operation in a county.

c. Plans for the construction of an industrial facility in a county at some future date.

Data Requirements: *The Planning Group must provide the following data associated with the identified criteria for justifying any revisions to the industrial water demand projections.*

1. The quantity of water used on an annual basis by an industrial facility that has recently located in a county and was not included in the Board's database.

2. The North American Industrial Classification (NAIC) of the industrial facility that has recently located in a county. The NAIC is the numerical code for identifying the classification of establishments by type of activity in which they are engaged as defined by the U.S. Office of Management and Budget and is a successor of the Standard Industrial Classification (SIC).

3. Documentation of plans for an industrial facility to locate in a county at some future date will include the following data:

a. Confirmation of land purchased for the facility or lease arrangements for the facility.

b. The quantity of water required by the planned facility on an annual basis.

c. The proposed construction schedule for the facility including the date the facility will become operational.

d. The NAIC for the planned facility.

2.2.3 County Population Projections

Due to the lack of new population data from the U.S. Census Bureau, the baseline population projections for the 2011 RWP were determined from the 2006 RWP. The RHWPG methodology used to calculate county populations across the planning decades is described in detail below.

Through interpolation of the 2000 U.S. Census Population and the 2006 RWP Projected Population for 2010, the projected population by county for 2007 was determined and compared with the SDC 2007 county estimates. The projection “error” was calculated by comparing the estimated population from the SDC for 2007 and the interpolated 2006 RWP Projected Population. The projection “error” by county is shown in *Table 2-1*. If the “error” for a county was greater than -5 percent, the county was marked for revision by the RWPG. This procedure affected five counties: Brazoria; Chambers;

Fort Bend; Galveston; and Montgomery. The RWPG elected to revise the populations for four counties: Brazoria; Chambers; Fort Bend; and Montgomery. Galveston was not selected due to the ongoing effects of Hurricane Ike, although the “error” was identified as -7.99 percent. The long-term impacts of this event will be determined after the 2010 Census is available. Harris County was also selected for revision by the RWPG even though the percentage of the projection “error” was below the established threshold due to the magnitude of population involved.

For Brazoria, Chambers, Fort Bend, and Montgomery Counties, the 2011 RWP population projections were calculated by revising the slope of the 2006 RWP projections. The decadal projections from the 2006 RWP were increased by the projection “error” identified in *Table 2-1*. The resulting value by decade was then added to the 2006 RWP projected population to create the 2011 RWP population projections. See *Figures 2-2* through *2-5* for a comparison of 2006 and 2011 population projections.

For Harris County, the new population projections were calculated using a revised y-intercept method. The numerical population difference between the SDC 2007 county estimates and the interpolated 2006 RWP Projected Population for 2007 was added to each decade population projection in the 2006 RWP to create the 2011 RWP population projections.

A third option for determining population projections, yielding higher levels of growth throughout the planning period, was also considered for some of the suburban counties that have been historically under-projected, such as Fort Bend County. This methodology was reviewed by TWDB but it was recommended that the RHWPG retain the more conservative method described above. Additional data will be available as a result of the 2010 Census and this will provide for a better understanding of population growth in these counties during the development of the 2016 RWP.

For the remaining 10 counties, the county population projections from the 2006 Regional Water Plan were used in this planning period.

Table 2-1
Projection Error

County Name	Projection "Error"
Austin	-4.85%
Brazoria	-6.93%
Chambers	-9.26%
Fort Bend	-11.39%
Galveston	-7.99%
Harris	-3.25%
Leon	6.69%
Liberty	0.93%
Madison	0.05%
Montgomery	-8.54%
Polk (all)	-1.60%
San Jacinto	3.81%
Trinity (all)	4.51%
Walker	5.49%
Waller	-2.68%
Total	**-4.55%**

2.2.4 Sub-County Population Projections

In addition to the WUGs examined in the 2006 RWP, additional WUGs were identified from the criteria listed in *Section 2.2.1*, including North Fort Bend Water Authority (NFBWA), Kendleton, Montgomery, Stagecoach, and Central Harris County Regional Water Authority (CHCRWA). These new WUG population projections are shown in *Table 2-2*.

Table 2-2
New WUG Population Projections

WUG Name	County	2010	2020	2030	2040	2050	2060
KENDLETON	FORT BEND	601	775	1,000	1,290	1,664	2,147
NFBWA	FORT BEND	140,385	238,775	318,353	387,602	447,877	496,345
CHCRWA	HARRIS	29,950	41,550	41,550	41,550	41,550	41,550
NFBWA	HARRIS	6,954	6,824	6,875	7,244	7,469	7,429
MONTGOMERY	MONTGOMERY	1,200	5,000	7,500	10,000	12,500	15,000
STAGECOACH	MONTGOMERY	626	861	1,185	1,630	2,243	3,086

TWDB also developed and supplied WUG alternative projections when the SDC data for 2007 indicated that a WUG population was under-projected by 5 percent or greater. These alternative projections are shown in *Table 2-1* at the end of the chapter.

Using the updated county and WUG projections, each county was evaluated separately to ensure the County totals were met. This was accomplished through applying the following methods.

For counties with no TWDB-developed WUG alternative projections, i.e. Galveston and Walker, no changes were made. For counties with TWDB-developed WUG alternative projections but with no revised County total projections, the difference in population was taken or added to the County-Other WUG. This method was used for the majority of counties: Austin; Leon; Liberty; Madison; Polk; San Jacinto; and Waller.

For Brazoria County, the TWDB-developed WUG alternative projections resulted in a net increase in population greater than the increase identified for the county as a whole. To account for the overage, the difference between the 2006 RWP projections and the TWDB-developed WUG alternative projections were summed by basin. The percentage difference between this value and the excess was multiplied by each summed basin increase. The result was subtracted from the County-Other for each basin.

For Montgomery County, the TWDB-developed WUG alternative projections occurred in the Trinity & Trinity-San Jacinto Basins. The remaining population was distributed through the Utility District and County-Other WUGs based on the percentage change between the planning decades and the total increase of Utility District and County-Other WUGs by decade. This accounts for growth in both of these population centers that were not considered by the 2007 SDC estimates. This method was preferred over the addition of this population to County-Other, which already represented a large portion of the county population as a whole.

For Chambers County, a similar method to Montgomery County was applied for distributing population growth. However, County-Other in Chambers County was not projected to grow in the 2006 RWP projections. Therefore, all additional growth in the county was assumed to occur in utility districts as growth in municipalities was already considered in the 2007 SDC estimates.

For Harris County, excess population, resulting from the net change in WUG populations based on the TWDB-alternative projections and growth in the county, was distributed to County-Other in all basins.

The incorporation of the TWDB-alternative projections in Fort Bend County exceeded the overall county population growth. Therefore, the population in County-Other was reduced to account for this discrepancy.

2.2.5 WUG Population and Demand Projections Survey

Correspondence was sent to all named WUGs detailing the draft population and demand projections for the 2011 RWP. A representative letter is shown in *Appendix 2-1*. WUG representatives were asked to submit desired projections through an online database along with justification. Revisions had to meet criteria from State discussed in *Section 2.2.7*. For WUGs requesting additional information, additional guidance was provided on criteria and data requirements. Sixteen WUGs responded with suggested population and water demand projections. In general, the differences in the projections were reconciled with the County-Other projections in order to maintain the County totals. Therefore, agreed upon county totals were maintained wherever possible. In Fort Bend County, requests for increased population exceeded the population in County-Other in the 2010 and 2020 decades. To resolve this, the County-Other populations in these decades were retained and the overall county populations were increased.

Changes for individual WUGs are as follows:

1. Crosby Municipal Utility District (MUD) supplied population projections based on their amended Water Conservation Plan, which projected to the year 2050. Using the previous growth in the Water Conservation Plan, the year 2060 projection was determined through extrapolation. Crosby MUD has not reached ultimate development and increases in their population projections were subtracted from the County-Other for Harris County.

2. Fort Bend County MUD #23 supplied population projections indicating higher growth projections and reaching ultimate development by the 2020 planning decade. In order to supplement the higher projections for the decades 2010 through 2040, population was removed from the County-Other population for Fort Bend County to maintain the County total. The excess population originally projected above the ultimate development level for the 2050 and 2060 decades were added back into the County-Other population for Fort Bend County.

3. Fort Bend County MUD #67 provided revised population projections from the previously supplied projections. These increases were taken from the County-Other for Fort Bend County.

4. Fort Bend County MUD #69 supplied population projections increases from the previously supplied projections. These increases were taken from the County-Other for Fort Bend County.

5. Huntsville supplied initial population projections which were significantly higher than the projections from the 2006 RWP based on a study performed by a consultant. The supplied projections resulted in a population excess represented in County-Other for Walker County, meaning the County total would have to be revised to incorporate the increase. The RHWPG requested that further study be performed to develop these projections at the May 6, 2009 meeting.

Following correspondence with the City of Huntsville, a hybrid projection was developed retaining the 2010 and 2020 estimates from the City of Huntsville while the 2030 projection follows the same growth pattern as the 2006 RWP projections between 2020 and 2030. The population is held constant through the rest of the planning horizon, as the 2006 RWP projections start to drop over this time. Huntsville's new population projections were divided accordingly by basin as allocated in the 2006 RWP. The projection provides for near-term growth until the next round of planning when the 2010 Census is available. At the same time, the projections do not require an increase to the Walker County control population.

6. Montgomery supplied projections based on a recent demographic study, projected build-out, and land use survey. The increases were taken from the County-Other for Montgomery County.

7. Montgomery County MUD #8 and Montgomery Country MUD #9 supplied joint population projections which were lower than the projections supplied to the WUGs. The excess population was added back into County-Other.

8. The NFBWA encompasses 53 utility districts and 1 municipality. The NFBWA supplied projections based on their Groundwater Reduction Plan (GRP). The municipal WUG, Fulshear, was subtracted from the projections to be shown separately. The remaining population projections were divided accordingly by basin, as allocated in the 2006 RWP.

9. Northwest Park MUD provided revised projections demonstrating an increase in population due to annexed area in excess of the Year 2000 boundary for their district. The increases were taken from the County-Other for Harris County.

10. Panorama Village supplied population projections lower than the projections from the 2006 RWP due to limited acreage, Water Audit Reports, and remaining vacant lots. The decreases in Panorama Village population projections were added into the County-Other for Montgomery County.

11. The TWDB-developed alternative projection for Richmond was based on the 2007 SDC estimate that projected a much higher rate of growth than was projected in the 2006 RWP. Richmond supplied initial population projections lower than those projected in the 2006 RWP. After reviewing the projections, the RWPG requested that these projections be reconsidered due to this discrepancy. Data from the U.S. Census suggested a 2 percent growth from the year 2001 to the year 2007 while the SDC predicted a 4.2 percent growth over the same period. A projection based on the Census-developed growth rate was prepared by Richmond which resulted in a long-term projection between what was presented in the 2006 RWP and the alternative projection provided by TWDB.

12. Riverside Water Supply Corporation supplied population projections based on current population, their Water Conservation and Drought Contingency Plan, and growth rate established from previous decades. The increases in population projections occurred in 2010 as well as decades 2040 through 2060.

13. Shenandoah supplied population projections based on the difference in the TWDB-developed alternative population projections and the current population. The current population was determined by using the latest connection count multiplied by the City constant of 3.5 people per connection. This difference was assumed to be a one-time correction and was added to the population projections in subsequent decades.

14. Sugar Land supplied population projections based on growth within their city limits, although the city has planned annexation of established MUDs within their existing extraterritorial jurisdiction within the next year. These annexed areas have not been included in the projections for the City

of Sugar Land, but will be considered later.

15. The West Harris County Regional Water Authority (WHCRWA) encompasses the northwest corner of Harris County, with portions in Fort Bend County. WHCRWA supplied population from their latest GRP update. The populations projections supplied were divided accordingly by county as allocated in the 2006 RWP.

These projections were submitted to the RHWPG on May 6, 2009. The RHWPG approved the majority of the population projections, the exceptions being 2 WUGs which were recommended for further examination. The RHWPG again visited the proposed projections for the Cities of Richmond and Huntsville at the July 1, 2009 meeting and moved to approve these remaining projections, therein.

2.2.6 Municipal Water Demand Projection Methodology

Municipal water demand projections were provided by TWDB for all WUGs identified in the population projection process. The components of the water demand projection process are population projection and per capita water use with plumbing code savings included. *Sections 2.2.1* through *2.2.3* discussed the methodology used to determine the population projections for the region. Through correspondence, WUGs were asked for input regarding their population projections and per capita water use. Unless the WUGs submitted a per capita water use revision, the TWDB used per capita water use values from the 2006 RWP in calculating municipal water demands. If per capita water use revisions were requested by a WUG, the request was sent to TWDB for review and approval. Revised per capita water uses approved by TWDB were then used in place of the 2006 RWP per capita water demands. For WUGs requesting a per-capita usage rate change, the WUG-recommended rates are as follows:

Huntsville – 160 gpcd
NFBWA – 210 gpcd
WHCRWA – 169 gpcd

For more information on TWDB estimates, please reference the 2006 Region H RWP. TWDB guidelines for revisions to municipal water demand projections state that adjustments in per capita usage rates can be proposed if more recent data indicates that per capita use has changed. See *Section 2.2.7* below. These projections were adopted by the TWDB and are presented for each municipal and non municipal WUG by county, river basin, and decade in *Table 2-3* at the end of the chapter.

2.2.7 Steam Electric Power Generation Water Demand Projection Methodology

Steam electric power generation demand estimates were generated in a 2008 study performed by the Bureau of Economic Geology (BEG). These projections were examined by TWDB planning staff prior to submission to the RWPG for consideration. A comparison of steam electric demand projections for the 2006 RWP and the 2011 TWDB-provided projections are shown in *Figures 2-1* and *2-2*. For the second half of the planning horizon the two projections are similar, although the 2006 RWP projection tended to be slightly higher overall. The 2011TWDB-provided projections also include a reduction in demands for the 2020 decade. Due to the slightly more conservative demand estimates and more consistent linearly-increasing trend for prior demand projections, the RWPG elected to retain steam electric demand projections from the 2006 RWP.

2.2.8 Other Water Demand Projection Methodology

For remaining water demand types including irrigation, livestock, manufacturing, and mining, there was not sufficient evidence of change to warrant revisions to water demand projections. For this reason, other water demand values for these categories were retained from the 2006 RWP. For more information on how these water demands were determined, please reference the 2006 RWP.

Figure 2-1
Steam Electric Demand Projection Comparison

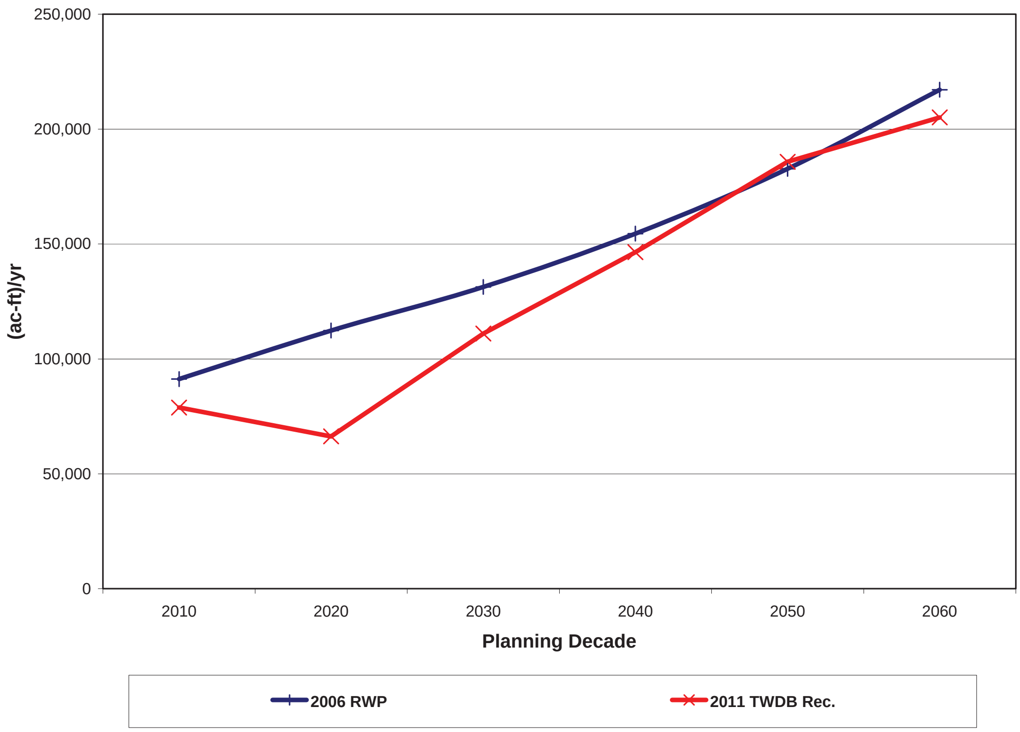
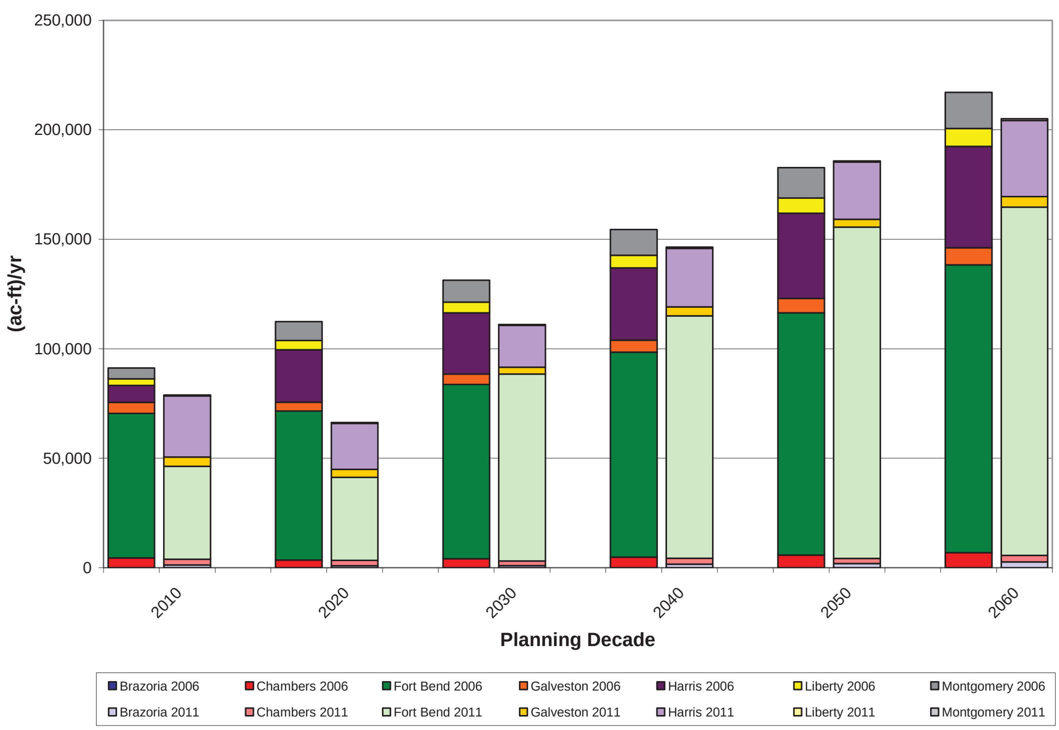


Figure 2-2
Steam Electric Demand Projection Comparison by County



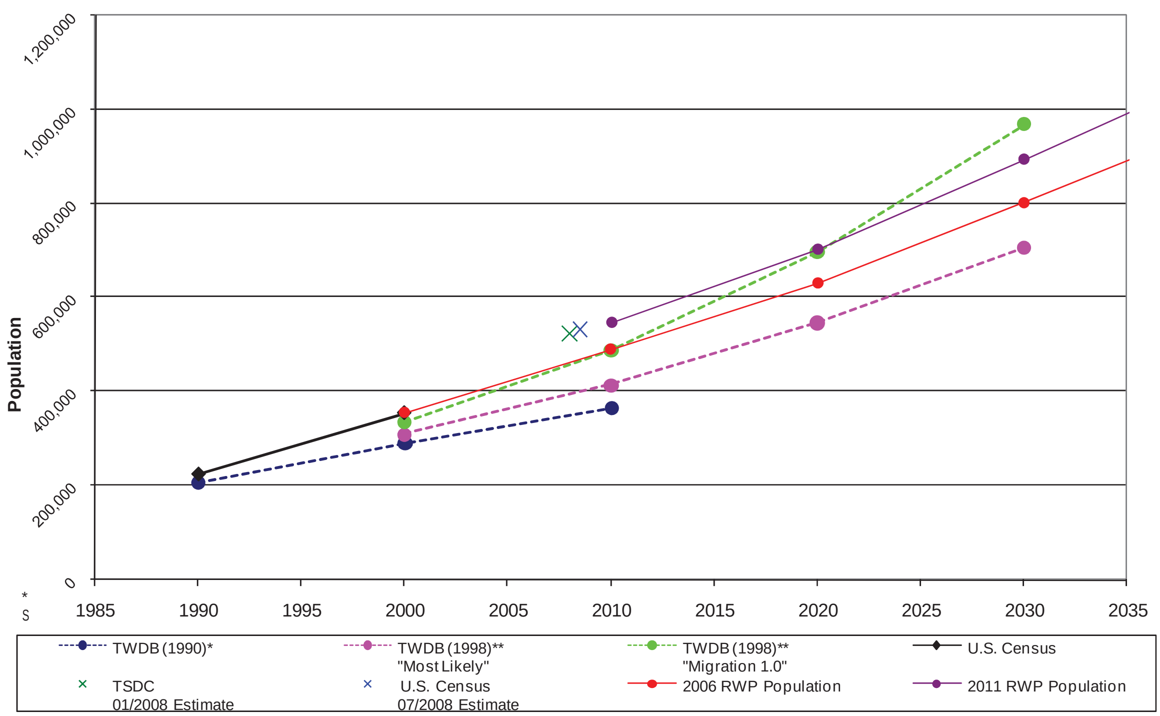
2.2.9 TWDB Approval of Revised Population and Demand Projections

Upon adoption of the recommended population and water demand projection by the RHWPG in May and July of 2009, these projections were submitted to TWDB for their consideration and approval at their November, 2009 meeting. This concluded the population and water demand projection development phase of the 2011 RWP development.

2.2.10 Region H Resolution on Fort Bend County

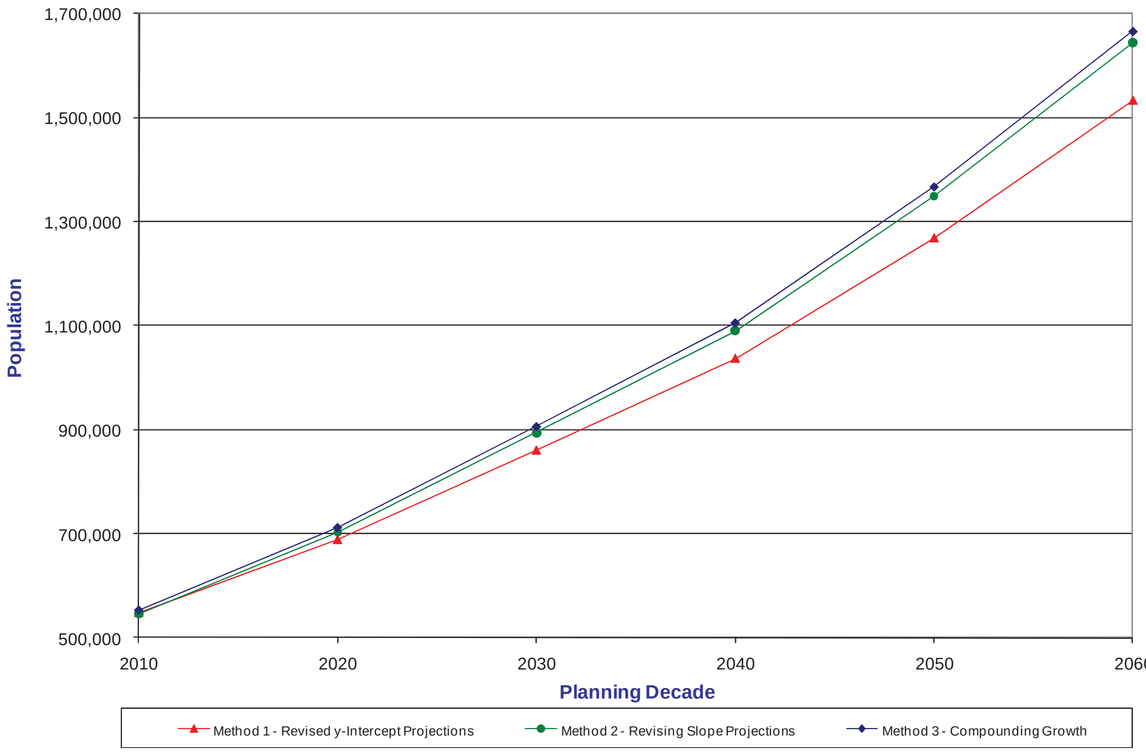
Despite the approval of population projections by the RHWPG and, later, the TWDB, the RHWPG wished to express an interest in increasing population projections for Fort Bend County. This concern was a direct result of past population projections for Fort Bend County that under-predicted the rapid growth experienced in this suburban county (*Figure 2-3*). In response, the RHWPG adopted a resolution at their November 4, 2009 meeting to express this concern and urge thorough consideration of future growth in the next planning round to address needs of developing counties such as Fort Bend. A copy of this resolution can be found in *Appendix 2B*.

Figure 2-3
Comparison of Population Projections for Fort Bend County



Additionally, the alternate population projection for Fort Bend County discussed in Section 2.2.3, above was also considered for Fort Bend County. Although this projection represents only a marginal increase in population over the approved projection, the result is an increase in population of another 21,599 people by the year 2060. The resulting water demand increase under this scenario would be another 3,966 acre-feet per year in 2060. This additional growth is shown in *Figure 2-4* and means in which to meet these needs are described in *Chapter 4*.

Figure 2-4
Alternative Population Projections for Fort Bend County



2.3 Regional Summary of Population and Water Demand Projections

This section discusses population projections and municipal, irrigation, livestock, manufacturing, mining, and steam electric power generation water demands for each of the fifteen counties in Region H. These projections were developed using the general methodology described in *Section 2.2*. *Figures 2-5*, *2-6*, and *Table 2-4* at the end of this chapter present a graphical summary of the total water demand for Region H by water use category and a summary of Region H's total revised water demand projections by water user category from the 2006 RWP and the 2011 RWP at a county level, respectively.

After the revised population and water demand projections were approved by the RWPG and formally adopted by the TWDB, the projections were incorporated into the TWDB online database DB12.

Figure 2-5
Water Demand by Decade

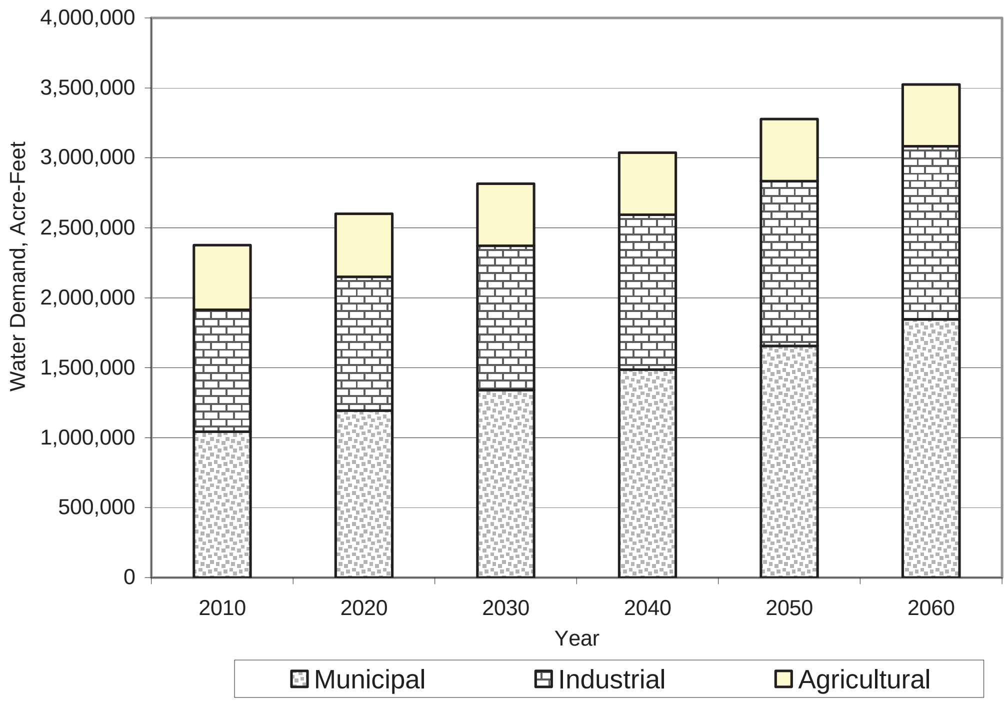
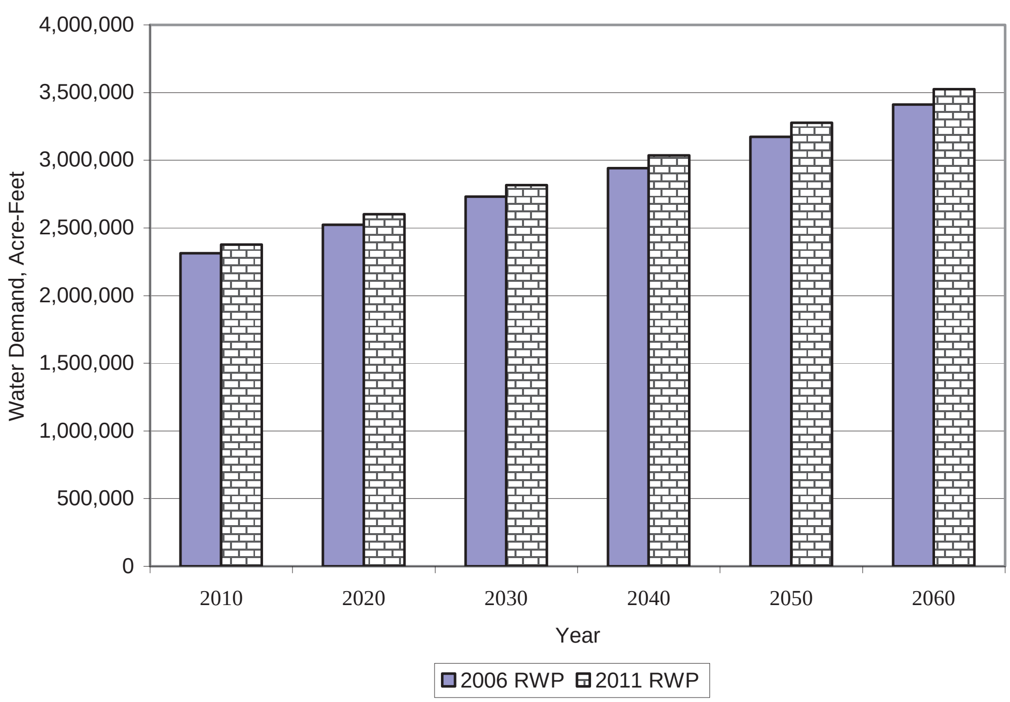


Figure 2-6
Comparison of Water Demand Estimates



2.3.1 Regional Summary of Projections by Category

Population
The revised population projections indicate that Region H's population will grow from 6,020,078 in the year 2010 to 11,346,082 in the year 2060. When comparing the 2006 plan and 2011 plan population estimates for the region, there is roughly a 4 percent population increase between the two plans for all the decades between 2010 and 2060. *Table 2-4*, located at the end of this chapter, presents the population projections by county, river basin, and decade.

Municipal Water Demand
Revised municipal water demand projections for Region H show an increase in projected demand from 1,042,864 AFY in the year 2010 to 1,844,817 AFY in the year 2060. When comparing the municipal water demand estimates for the region in the 2006 RWP versus the 2011 RWP, there is a 6 percent increase in the year 2010 and a 7 percent increase for the remaining planning decades. The revised projections by county for each municipal WUG are provided in *Table 2-5*, at the end of this chapter, by county and by river basin.

Manufacturing Water Demand
The proposed manufacturing water demands for all counties in Region H are the projections used in 2006 RWP. The proposed manufacturing water demand for Region H is projected to increase from 722,873 to 950,102 AFY across the 6-decade planning period. The projections are provided in *Table 2-5* at the end of the chapter as well as in the TWDB Database DB12.

Irrigation Water Demand
Total irrigation water demand for the region is projected to decrease from 450,175 to 430,930 AFY between decades 2010 and 2060. The proposed change results in a 4 percent decrease over the 6-decade planning period. The projections are provided in *Table 2-5* at the end of the chapter as well as in the TWDB online database DB12.

Steam Electric Power Generation Water Demand
Region H retained the steam electric power generation water demand projections presented in the 2006 RWP. As a result, the 2011 RWP proposed steam electric power generation water demands for Region H are 91,231 AFY in 2010 and 217,132 AFY in 2060. This represents a 138 percent increase over the 6-decade planning period. The projections are provided in *Table 2-5* at the end of the chapter as well as in the TWDB Database DB12.

Mining Water Demand
No changes in mining water demand were made from the 2006 Region H RWP The proposed mining water demand by decade for Region H is 56,976 AFY in the year 2010 and 69,457 AFY in 2060. This represents a 22 percent increase across the 6-decade planning period. The projections are provided in *Table 2-5* at the end of the chapter as well as in the TWDB Database DB12.

Livestock Water Demand
Livestock demand projections for the 2006 RWP were retained in this round of planning. The livestock water demand by decade for Region H is 12,228 AFY, which was held constant for all decades from 2010 to 2060. The revised projections are provided in *Table 2-5* at the end of the chapter as well as in the TWDB Database DB12.

2.3.2 County Summary of Projections

The revised projections by county for each municipal WUG are provided in *Table 2-4* at the end of this chapter, by county and by river basin. Unless otherwise stated, the TWDB default population and water demand projection methodologies, as described in *Section 2.2.7*, were used. For counties with population totals revised since the 2006 RWP, water demands are shown in *Figure 2-6* at the end of the chapter.

Austin

Municipal population projections for Austin County show population increasing from 27,173 in year 2010 to 35,958 in year 2060. This represents a 32 percent increase in projected population over the 6-decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Austin County, there is a linear increase of 1 percent starting at 1 percent in municipal water demand increase in the 2011 RWP for each planning decade until 2050. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Austin County remained constant from the 2006 RWP. Manufacturing demands ranged from 210 to 313 AFY from 2010 to 2060.

Brazoria

Municipal population projections for Brazoria County show population increasing from 305,649 in year 2010 to 538,795 in year 2060. This represents a 76 percent increase in projected population over the 6-decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Brazoria County, there is a steady 1 percent increase in municipal water demands in the 2011 RWP for each planning decade. The increase in municipal water demands is a result of more accurate baseline population projections and per capita water use estimates. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Brazoria County remained constant from the 2006 RWP. Mining demands are predicted to increase over the 6-decade planning period. Currently, there are no steam electric power generation demands projected in Brazoria County.

Chambers

Municipal population projections for Chambers County show population increasing from 34,282 in the 2010 decade to 62,850 in the 2060 planning decade. This represents an 83 percent increase in projected population over the 6-decade planning period. Municipal water demand estimates for Chambers County show demands increasing from 176,883 in the 2010 decade to 198,800 in the 2060 planning decade. This represents a 12 percent increase in projected population over the 6-decade planning period. In the 2011 RWP, the irrigation, livestock, manufacturing, mining, and steam-electric power generation demands for Chambers County remained constant from the 2006 RWP.

Fort Bend

Municipal population projections for Fort Bend County show population increasing from 550,121 in year 2010 to 1,643,825 in year 2060. This represents approximately a 199 percent increase in projected population over the 6-decade planning period. Municipal water demands increase from 109,869 in year 2010 to 300,689 in year 2060. This represents a 174 percent increase in municipal water demands over the 6-decade planning period. The projections in municipal water demands are the result of more accurate baseline population projections and per capita water use estimates. Manufacturing demands in Fort Bend County increase by 8 percent over the 6-decade planning period. The overall mining demands increase from 3,010 in year 2010 to 3,196 in year 2060, representing a 6 percent increase. Steam electric power generation demand projections increase by 99 percent over the 6 decades of planning from 66,026 in year 2010 to 131,527 in year 2060. In the 2011 RWP, the irrigation, livestock, manufacturing, mining, and steam-electric power generation demands for Fort Bend County remained constant from the 2006 RWP.

Galveston

Municipal population projections for Galveston County show population increasing from 268,714 in year 2010 to 302,774 in year 2060. This represents a 13 percent increase in projected population over the 6-decade planning period. Municipal water demands increase from 103,061 in year 2010 to 121,863 in year 2060. This represents an 18 percent increase in municipal water demands over the 6-decade planning period. The change in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Manufacturing demands in

Galveston County are expected to increase by 35 percent over the 6-decade planning period. Projected mining and steam electric power generation demands also increase over the 60 year planning period, 16 and 54 percent, respectively. In the 2011 RWP, the irrigation, livestock, manufacturing, mining, and steam-electric power generation demands for Galveston County remained constant from the 2006 RWP.

Harris
Municipal population projections for Harris County show population increasing from 4,078,231 in the 2010 decade to 6,833,751 in the 2060 planning decade. This represents a 68 percent increase in projected population over the 6-decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Harris County, there is a 3 percent municipal water demand increase for the 2010 through 2030 decades and a 2 percent increase for the 2040 through 2060 decades. The change in the baseline municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Livestock and irrigation demand projections remain a constant water demand at 1,133 and 15,300 AFY, respectively. While manufacturing, mining, and steam electric power generation demands are expected to increase by 21, 499, and 41 percent, respectively, over the 6-decade planning period. In the 2011 RWP, the irrigation, livestock, manufacturing, mining, and steam-electric power generation demands for Harris County remained constant from the 2006 RWP.

Leon
Municipal population projections for Leon County show population increasing from 18,231 in year 2010 to 23,028 in year 2060. This represents a 26 percent increase in projected population over the 6 decades. Municipal water demand estimates for Leon County show demands increasing from 6,592 in the 2010 decade to 7,347 in the 2060 planning decade. This represents an 11 percent increase in projected population over the 6 decades. Manufacturing demand projections are expected to increase by 84 percent over the 60 year planning period for Leon County. Mining demands are predicted to decrease by 10 percent over the 60 year planning period. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Leon County remained constant from the 2006 RWP. There is not a steam electric power generation demand in Leon County.

Liberty
Municipal population projections for Liberty County show population increasing from 81,930 in year 2010 to 147,845 in year 2060. This represents an 80 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Liberty County, there is a 1 percent municipal water demand increase in the 2011 RWP for the 2030 through 2060 planning decades. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Manufacturing demand projections show an 87 percent increase over the 60 year planning period. Mining demand projections show a 1 percent increase over the 60 year planning period. In the 2011 RWP, steam-electric power generation demand projections show a 177 percent increase over the 60 year planning period. In the 2011 RWP, the irrigation, livestock, manufacturing, mining, and steam-electric power generation demands for Liberty County remained constant from the 2006 RWP.

Madison
Municipal population projections for Madison County show population increasing from 13,905 in year 2010 to 17,560 in year 2060. This represents a 26 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Madison County, there is a 15 percent municipal water demand increase over the 6 planning decades. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Manufacturing water demand projections estimate a 53 percent increase over the 6 decade planning period, and there is no steam electric power generation demand projected in the county. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Madison County remained constant from the 2006 RWP.

Montgomery

Municipal population projections for Montgomery County show population increasing from 453,369 in year 2010 to 1,444,999 in year 2060. This represents a 219 percent increase in projected population over the 6 decade planning period. Municipal water demand estimates show a steady 8 percent increase for the 2010 and 2020 planning decades and a 9 percent increase for the 2030 through 2060 planning decades. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Livestock and irrigation demand projections in the 2011 RWP remain the same as in the 2006 RWP. Mining demand projections show an increase of 19 percent, manufacturing demand is projected to increase 66 percent, and the steam electric power generation demand is projected to increase 227 percent in the 60 year planning period covered in the 2011 RWP.

Polk

Municipal population projections for Polk County show population increasing from 37,650 in year 2010 to 54,380 in year 2060. This represents a 44 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Polk County, there is a municipal water demand increase ranging between 4 and 14 percent in the 2011 RWP, depending on the planning decade. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. There are no demands shown for manufacturing, irrigation, and steam electric power generation in Polk County. Livestock demands remain consistent with the projections in the 2006 RWP. Mining demands increase 21 percent over the 6-decade planning period.

San Jacinto

Municipal population projections for San Jacinto County show population increasing from 27,443 in year 2010 to 41,299 in year 2060. This represents a 50 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for San Jacinto County, there is a municipal water demand increase ranging between 14 and 21 percent in the 2011 RWP, depending on the planning decade. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Manufacturing demand projections increase by 42 percent while mining demand projections show a 13 percent decrease across the 6-decade planning period. Currently, no steam electric power generation demands are projected for San Jacinto County. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for San Jacinto County remained constant from the 2006 RWP.

Trinity

Municipal population projections for Trinity County show population increasing from 11,571 in year 2010 to 11,673 in year 2060. This represents a 1 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Trinity County, there is a 5 percent municipal water demand decrease across the 6-decade planning period. The decrease in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Currently, there are no projected manufacturing and steam electric power generation demands in the Trinity County. Irrigation, livestock, and mining demands remain consistent with the projections in the 2006 RWP.

Walker

Municipal population projections for Walker County show population increasing from 70,672 in year 2010 to 80,737 in year 2060. This represents a 14 percent increase in projected population over the 6 decade planning period. When comparing the 2006 and 2011 RWP municipal water demand estimates for Walker County, there is a 6 percent municipal water demand increase in the 2011 RWP. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Manufacturing water demand estimates show an increase by 72 percent from 3,208 AFY in year 2010 to 5,517 AFY in year 2060. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Walker County remained consistent with the 2006 RWP.

Waller

Municipal population projections for Waller County show population increasing from 41,137 in the 2010 decade to 106,608 in the 2060 planning decade. This represents a 159 percent increase in projected population over the 6 decades. When comparing the 2006 and 2011 RWP municipal water demand estimates for Waller County, there is a steady municipal water demand increase in the 2011 RWP, ranging from 1 to 8 percent across the planning decades. The increase in municipal water demand is a result of more accurate baseline population projections and per capita water use estimates. Irrigation, livestock, and mining demands are projected to remain constant at 22,978 AFY, 632 AFY, and 13 AFY, respectively. Manufacturing demand projections are projected to steadily increase from 89 AFY in the 2010 decade to 144 AFY in the 2060 decade, approximately a 62 percent increase. Currently, there are no projected steam electric power generation demands in Waller County. In the 2011 RWP, the irrigation, livestock, manufacturing, and mining demands for Waller County remained consistent with the 2006 RWP.

Table 2-3
TWDB Alternative Population

County Name	City Name	Version	2010	2020	2030	2040	2050	2060
LIBERTY	AMES	2006 SWP	1,140	1,207	1,271	1,334	1,403	1,480
LIBERTY	AMES	TWDB Rev	1,338	1,623	1,897	2,165	2,459	2,789
BRAZORIA	ANGLETON	2006 SWP	18,951	19,805	20,623	21,377	22,176	23,010
BRAZORIA	ANGLETON	TWDB Rev	19,999	20,900	21,763	22,559	23,402	24,282
CHAMBERS	BAYTOWN	2006 SWP	3,541	3,972	4,373	4,720	5,072	5,433
CHAMBERS	BAYTOWN	TWDB Rev	3,754	4,211	4,636	5,004	5,377	5,760
HARRIS	BAYTOWN	2006 SWP	65,231	67,134	69,007	70,861	72,703	74,538
HARRIS	BAYTOWN	TWDB Rev	69,151	71,168	73,154	75,119	77,072	79,017
AUSTIN	BELLVILLE	2006 SWP	4,191	4,567	4,830	4,986	5,061	5,164
AUSTIN	BELLVILLE	TWDB Rev	5,213	6,560	7,499	8,057	8,325	8,692
BRAZORIA	BRAZORIA	2006 SWP	2,845	2,906	2,964	3,017	3,074	3,133
BRAZORIA	BRAZORIA	TWDB Rev	3,061	3,127	3,189	3,246	3,307	3,370
WALLER	BROOKSHIRE	2006 SWP	3,930	4,499	5,133	5,838	6,678	7,642
WALLER	BROOKSHIRE	TWDB Rev	4,616	5,997	7,535	9,246	11,284	13,624
MONTGOMERY	CONROE	2006 SWP	49,602	57,413	72,685	90,440	113,860	141,060
MONTGOMERY	CONROE	TWDB Rev	59,845	78,924	102,013	127,459	161,024	200,007
LIBERTY	DAYTON	2006 SWP	6,160	6,656	7,132	7,598	8,109	8,682
LIBERTY	DAYTON	TWDB Rev	7,491	9,454	11,336	13,180	15,201	17,467
FORT BEND	FULSHEAR	2006 SWP	883	1,056	1,268	1,486	1,772	2,098
FORT BEND	FULSHEAR	TWDB Rev	1,098	1,401	1,772	2,154	2,654	3,226
WALLER	HEMPSTEAD	2006 SWP	5,724	6,947	8,309	9,825	11,630	13,703
WALLER	HEMPSTEAD	TWDB Rev	7,389	10,585	14,143	18,102	22,817	28,232
FORT BEND	KATY	2006 SWP	1,078	1,274	1,514	1,761	2,084	2,453
FORT BEND	KATY	TWDB Rev	1,548	2,072	2,712	3,370	4,233	5,220
HARRIS	KATY	2006 SWP	13,372	16,576	19,727	22,846	25,946	29,034
HARRIS	KATY	TWDB Rev	17,294	21,438	25,513	29,547	33,556	37,550
WALLER	KATY	2006 SWP	804	804	804	804	804	804
WALLER	KATY	TWDB Rev	1,462	2,241	3,109	4,074	5,224	6,544
HARRIS	LEAGUE CITY	2006 SWP	143	147	151	155	159	163
HARRIS	LEAGUE CITY	TWDB Rev	180	185	190	195	200	205
POLK	LIVINGSTON	2006 SWP	5,609	5,784	5,922	6,029	6,144	6,254
POLK	LIVINGSTON	TWDB Rev	6,740	8,025	9,061	9,829	10,539	11,232
MONTGOMERY	MAGNOLIA	2006 SWP	1,350	1,496	1,782	2,114	2,552	3,061
MONTGOMERY	MAGNOLIA	TWDB Rev	2,151	3,012	4,054	5,203	6,718	8,478
BRAZORIA	MANVEL	2006 SWP	3,046	3,046	3,046	3,046	3,046	3,046
BRAZORIA	MANVEL	TWDB Rev	4,510	4,510	4,510	4,510	4,510	4,510
FORT BEND	MEADOWS	2006 SWP	4,912	4,912	4,912	4,912	4,912	4,912
FORT BEND	MEADOWS	TWDB Rev	6,961	6,961	6,961	6,961	6,961	6,961
FORT BEND	NEEDVILLE	2006 SWP	3,040	3,486	4,032	4,593	5,329	6,171
FORT BEND	NEEDVILLE	TWDB Rev	3,875	4,881	6,111	7,375	9,033	10,928
LEON	NORMANGEE	2006 SWP	714	753	777	778	775	778
LEON	NORMANGEE	TWDB Rev	768	862	918	921	916	923
MADISON	NORMANGEE	2006 SWP	44	44	44	44	44	44
MADISON	NORMANGEE	TWDB Rev	50	56	61	65	69	72
CHAMBERS	OLD RIVER-WINFREE	2006 SWP	1,482	1,613	1,735	1,841	1,948	2,058

Table 2-3 (Continued)
TWDB Alternative Population

County Name	City Name	Version	2010	2020	2030	2040	2050	2060
CHAMBERS	OLD RIVER-WINFREE	TWDB Rev	1,585	1,755	1,913	2,050	2,189	2,331
POLK	ONALASKA	2006 SWP	1,363	1,552	1,701	1,817	1,941	2,059
POLK	ONALASKA	TWDB Rev	1,562	1,944	2,252	2,480	2,691	2,897
BRAZORIA	PEARLAND	2006 SWP	63,685	80,689	96,167	110,461	125,585	141,358
BRAZORIA	PEARLAND	TWDB Rev	82,803	104,912	125,037	143,622	163,286	183,794
HARRIS	PEARLAND	2006 SWP	2,364	2,773	3,175	3,573	3,968	4,362
HARRIS	PEARLAND	TWDB Rev	3,074	3,606	4,129	4,647	5,161	5,673
FORT BEND	PLEAK	2006 SWP	1,158	1,377	1,645	1,920	2,281	2,694
FORT BEND	PLEAK	TWDB Rev	1,250	1,490	1,784	2,086	2,482	2,935
FORT BEND	RICHMOND	2006 SWP	12,173	13,305	14,689	16,112	17,978	20,110
FORT BEND	RICHMOND	TWDB Rev	15,891	19,713	24,386	29,191	35,492	42,692
BRAZORIA	RICHWOOD	2006 SWP	3,244	3,486	3,717	3,930	4,156	4,392
BRAZORIA	RICHWOOD	TWDB Rev	3,534	3,798	4,050	4,282	4,528	4,785
MONTGOMERY	ROMAN FOREST	2006 SWP	1,623	1,833	2,244	2,722	3,353	4,085
MONTGOMERY	ROMAN FOREST	TWDB Rev	4,372	6,934	10,035	13,452	17,959	23,194
FORT BEND	ROSENBERG	2006 SWP	28,100	32,305	37,446	42,732	49,665	57,587
FORT BEND	ROSENBERG	TWDB Rev	37,420	48,048	61,043	74,405	91,929	111,953
AUSTIN	SEALY	2006 SWP	5,922	6,562	7,008	7,273	7,400	7,574
AUSTIN	SEALY	TWDB Rev	7,902	10,421	12,178	13,222	13,723	14,410
MONTGOMERY	SHENANDOAH	2006 SWP	1,503	1,503	1,503	1,503	1,503	1,503
MONTGOMERY	SHENANDOAH	TWDB Rev	2,561	3,437	4,497	5,666	7,208	8,998
SAN JACINTO	SHEPHERD	2006 SWP	2,221	2,409	2,560	2,654	2,708	2,733
SAN JACINTO	SHEPHERD	TWDB Rev	2,604	3,168	3,619	3,900	4,063	4,137
FORT BEND	SIMONTON	2006 SWP	719	720	721	722	724	726
FORT BEND	SIMONTON	TWDB Rev	953	1,140	1,369	1,604	1,912	2,264
FORT BEND	SUGAR LAND	2006 SWP	72,500	72,500	72,500	72,500	72,500	72,500
FORT BEND	SUGAR LAND	TWDB Rev	89,427	89,427	89,427	89,427	89,427	89,427
HARRIS	TAYLOR LAKE VILLAGE	2006 SWP	4,004	4,004	4,004	4,004	4,004	4,004
HARRIS	TAYLOR LAKE VILLAGE	TWDB Rev	5,472	5,472	5,472	5,472	5,472	5,472
BRAZORIA	WEST COLUMBIA	2006 SWP	4,158	4,057	3,960	3,871	3,777	3,678
BRAZORIA	WEST COLUMBIA	TWDB Rev	4,404	4,297	4,194	4,100	4,000	3,895
MONTGOMERY	WOODBRANCH	2006 SWP	1,305	1,305	1,305	1,305	1,305	1,305
MONTGOMERY	WOODBRANCH	TWDB Rev	1,567	1,784	2,047	2,336	2,718	3,161

Table 2-4
Population by City, Collective Reporting Unit, Individual Retail Public Utility, and Rural County

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	BELLVILLE	AUSTIN	5,213	6,560	7,499	8,057	8,325	8,692		
H	COUNTY-OTHER	AUSTIN	11,617	10,771	10,181	9,830	9,661	9,430		
H	SAN FELIPE	AUSTIN	1,106	1,332	1,490	1,584	1,629	1,691		
H	SEALY	AUSTIN	7,902	10,421	12,178	13,222	13,723	14,410		
H	WALLIS	AUSTIN	1,335	1,490	1,598	1,662	1,693	1,735		
		AUSTIN Total	**27,173**	**30,574**	**32,946**	**34,355**	**35,031**	**35,958**		
H	ALVIN	BRAZORIA	23,231	25,123	26,935	28,605	30,375	32,223		
H	ANGLETON	BRAZORIA	19,999	20,900	21,763	22,559	23,402	24,282		
H	BAILEY'S PRAIRIE	BRAZORIA	744	795	844	889	938	988		
H	BRAZORIA	BRAZORIA	3,061	3,127	3,189	3,246	3,307	3,370		
H	BRAZORIA COUNTY MUD #1	BRAZORIA	7,517	11,063	14,458	17,587	20,904	24,368		
H	BRAZORIA COUNTY MUD #2	BRAZORIA	4,857	6,959	8,971	10,826	12,792	14,845		
H	BRAZORIA COUNTY MUD #3	BRAZORIA	4,987	7,340	9,593	11,669	13,870	16,168		
H	BRAZORIA COUNTY MUD #4	BRAZORIA	3,438	3,438	3,438	3,438	3,438	3,438		
H	BRAZORIA COUNTY MUD #5	BRAZORIA	4,743	4,743	4,743	4,743	4,743	4,743		
H	BROOKSIDE VILLAGE	BRAZORIA	2,282	2,618	2,939	3,235	3,549	3,877		
H	CLUTE	BRAZORIA	11,217	12,043	12,834	13,563	14,335	15,141		
H	COUNTY-OTHER	BRAZORIA	58,574	64,427	71,080	77,172	83,666	90,504		
H	DANBURY	BRAZORIA	1,747	1,888	2,023	2,148	2,280	2,418		
H	FREEPORT	BRAZORIA	15,794	19,006	22,082	24,917	27,922	31,059		
H	HILLCREST	BRAZORIA	744	767	789	810	832	855		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	HOLIDAY LAKES	BRAZORIA	1,141	1,189	1,235	1,278	1,323	1,370		
H	IOWA COLONY	BRAZORIA	911	1,022	1,129	1,227	1,331	1,440		
H	JONES CREEK	BRAZORIA	2,130	2,130	2,130	2,130	2,130	2,130		
H	LAKE JACKSON	BRAZORIA	29,383	32,502	35,488	38,241	41,159	44,205		
H	MANVEL	BRAZORIA	4,510	4,510	4,510	4,510	4,510	4,510		
H	ORBIT SYSTEMS INC	BRAZORIA	4,717	5,728	6,696	7,589	8,535	9,523	P	P
H	OYSTER CREEK	BRAZORIA	1,424	1,666	1,897	2,110	2,336	2,572		
H	PEARLAND	BRAZORIA	82,803	104,912	125,037	143,622	163,286	183,764		P
H	RICHWOOD	BRAZORIA	3,534	3,798	4,050	4,282	4,528	4,785		
H	SOUTHWEST UTILITIES	BRAZORIA	632	668	703	735	769	804	P	P
H	SURFSIDE BEACH	BRAZORIA	889	1,020	1,146	1,262	1,385	1,513		
H	SWEENY	BRAZORIA	3,895	4,177	4,447	4,696	4,960	5,236		
H	VARNER CREEK UD	BRAZORIA	2,341	2,852	3,341	3,792	4,270	4,769		
H	WEST COLUMBIA	BRAZORIA	4,404	4,297	4,194	4,100	4,000	3,895		
		BRAZORIA Total	**305,649**	**354,708**	**401,684**	**444,981**	**490,875**	**538,795**		
H	ANAHUAC	CHAMBERS	2,405	2,623	2,825	3,000	3,178	3,360		
H	BAYTOWN	CHAMBERS	3,754	4,211	4,636	5,004	5,377	5,760		P
H	BEACH CITY	CHAMBERS	2,358	3,153	3,892	4,532	5,182	5,848		
H	COUNTY-OTHER	CHAMBERS	3,788	3,728	3,673	3,627	3,578	3,527		
H	MONT BELVIEU	CHAMBERS	3,224	4,227	5,160	5,968	6,788	7,628		
H	OLD RIVER-WINFREE	CHAMBERS	1,585	1,755	1,913	2,050	2,189	2,331		
H	TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	17,168	21,089	24,739	27,902	31,110	34,396		
		CHAMBERS Total	**34,282**	**40,786**	**46,838**	**52,083**	**57,402**	**62,850**		
H	ARCOLA	FORT BEND	2,500	2,750	3,025	3,328	3,661	4,026		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	BEASLEY	FORT BEND	701	815	955	1,099	1,288	1,504		
H	COUNTY-OTHER	FORT BEND	21,782	10,481	33,794	91,338	212,962	351,307		
H	FAIRCHILDS	FORT BEND	929	1,189	1,507	1,834	2,263	2,754		
H	FIRST COLONY MUD #9	FORT BEND	8,120	8,424	8,728	9,032	9,336	9,640		
H	FORT BEND COUNTY MUD #106	FORT BEND	3,285	3,285	3,285	3,285	3,285	3,285		
H	FORT BEND COUNTY MUD #108	FORT BEND	2,817	2,817	2,817	2,817	2,817	2,817		
H	FORT BEND COUNTY MUD #111	FORT BEND	3,315	3,315	3,315	3,315	3,315	3,315		
H	FORT BEND COUNTY MUD #23	FORT BEND	12,600	18,000	18,000	18,000	18,000	18,000		
H	FORT BEND COUNTY MUD #25	FORT BEND	11,336	16,141	22,016	28,057	35,979	45,032		
H	FORT BEND COUNTY MUD #67	FORT BEND	3,759	3,759	3,759	3,759	3,759	3,759		
H	FORT BEND COUNTY MUD #68	FORT BEND	3,717	3,717	3,717	3,717	3,717	3,717		
H	FORT BEND COUNTY MUD #69	FORT BEND	2,086	2,086	2,086	2,086	2,086	2,086		
H	FORT BEND COUNTY MUD #81	FORT BEND	2,054	2,762	3,628	4,518	5,685	7,019		
H	FULSHEAR	FORT BEND	1,098	1,401	1,772	2,154	2,654	3,226		
H	HOUSTON	FORT BEND	39,890	46,657	54,931	63,439	74,596	87,345		P
H	KATY	FORT BEND	1,548	2,072	2,712	3,370	4,233	5,220		P
H	KENDLETON	FORT BEND	601	775	1,000	1,290	1,664	2,147		
H	MEADOWS	FORT BEND	6,961	6,961	6,961	6,961	6,961	6,961		
H	MISSOURI CITY	FORT BEND	76,758	96,601	115,617	134,918	148,313	179,508		P

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	NEEDVILLE	FORT BEND	3,875	4,881	6,111	7,375	9,033	10,928		
H	NFBWA (CRU)	FORT BEND	140,385	238,775	318,353	387,602	444,877	496,345		
H	ORBIT SYSTEMS INC	FORT BEND	163	183	207	232	264	301	P	P
H	PECAN GROVE MUD #1	FORT BEND	12,936	13,245	13,622	14,009	14,518	15,099		
H	PLANTATION MUD	FORT BEND	4,333	4,333	4,333	4,333	4,333	4,333		
H	PLEAK	FORT BEND	1,250	1,490	1,784	2,086	2,482	2,935		
H	RICHMOND	FORT BEND	15,891	19,713	24,386	29,191	35,492	42,692		
H	ROSENBERG	FORT BEND	37,420	48,048	61,043	74,405	91,929	111,953		
H	SIENNA PLANTATION MUD #2	FORT BEND	5,667	6,557	6,557	6,557	6,557	6,557		
H	SIMONTON	FORT BEND	953	1,140	1,369	1,604	1,912	2,264		
H	STAFFORD	FORT BEND	23,026	30,959	40,659	50,633	63,714	78,661		P
H	SUGAR LAND	FORT BEND	83,819	101,422	105,000	105,000	105,000	105,000		
H	WHCRWA (CRU)	FORT BEND	16,944	20,484	23,955	28,223	32,509	36,486		P
		FORT BEND Total	**550,121**	**719,737**	**893,875**	**1,090,710**	**1,348,851**	**1,643,825**		
H	BACLIFF MUD	GALVESTON	7,816	8,509	8,919	9,085	9,209	9,289		
H	BAYOU VISTA	GALVESTON	1,816	1,964	2,052	2,088	2,114	2,131		
H	BOLIVAR PENINSULAR SUD	GALVESTON	4,266	4,622	4,833	4,918	4,982	5,023		
H	CLEAR LAKE SHORES	GALVESTON	1,263	1,313	1,343	1,355	1,364	1,370		
H	COUNTY-OTHER	GALVESTON	8,523	7,429	6,781	6,517	6,322	6,196		
H	DICKINSON	GALVESTON	19,955	22,425	23,888	24,480	24,921	25,208		
H	FRIENDSWOOD	GALVESTON	24,553	27,415	29,110	29,796	30,307	30,639		P
H	GALVESTON	GALVESTON	57,247	57,247	57,247	57,247	57,247	57,247		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	GALVESTON COUNTY MUD #1	GALVESTON	3,493	4,071	4,413	4,552	4,655	4,722		
H	GALVESTON COUNTY WCID #12	GALVESTON	1,641	1,861	1,992	2,045	2,084	2,110		
H	HITCHCOCK	GALVESTON	6,660	6,897	7,037	7,094	7,136	7,163		
H	JAMAICA BEACH	GALVESTON	1,314	1,520	1,642	1,691	1,728	1,752		
H	KEMAH	GALVESTON	2,985	3,550	3,885	4,021	4,122	4,188		
H	LA MARQUE	GALVESTON	13,682	13,682	13,682	13,682	13,682	13,682		
H	LEAGUE CITY	GALVESTON	53,403	60,392	64,532	66,207	67,454	68,265		P
H	SAN LEON MUD	GALVESTON	6,795	7,481	7,887	8,051	8,173	8,253		
H	SANTA FE	GALVESTON	10,141	10,653	10,956	11,079	11,170	11,229		
H	TEXAS CITY	GALVESTON	41,891	42,211	42,400	42,477	42,534	42,571		
H	TIKI ISLAND	GALVESTON	1,270	1,489	1,619	1,672	1,711	1,736		
		GALVESTON Total	**268,714**	**284,731**	**294,218**	**298,057**	**300,915**	**302,774**		
H	BAYTOWN	HARRIS	69,151	71,168	73,154	75,119	77,072	79,017		P
H	BELLAIRE	HARRIS	17,272	18,859	20,420	21,965	23,500	25,029		
H	BLUE BELL MANOR UTILITY COMPANY	HARRIS	2,592	2,592	2,592	2,592	2,592	2,592		
H	BRITMOORE UTILITIES	HARRIS	2,061	2,444	2,821	3,194	3,565	3,934		
H	BUNKER HILL VILLAGE	HARRIS	3,750	3,750	3,750	3,750	3,750	3,750		
H	CANDLELIGHT HILLS SUBDIVISION	HARRIS	2,213	2,656	3,092	3,523	3,952	4,379		
H	CHCRWA (CRU)	HARRIS	29,950	41,550	41,550	41,550	41,550	41,550		
H	CHIMNEY HILL MUD	HARRIS	6,412	6,412	6,412	6,412	6,412	6,412		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	CLEAR BROOK CITY MUD WOODMEADOWS	HARRIS	10,417	11,852	13,263	14,660	16,048	17,431		
H	CONSUMERS WATER INC	HARRIS	4,243	5,778	7,288	8,782	10,267	11,746		P
H	COUNTY-OTHER	HARRIS	64,311	58,265	117,457	232,249	395,123	566,880		
H	CROSBY MUD	HARRIS	4,734	5,184	5,634	6,084	6,534	6,984		
H	CRYSTAL SPRNGS WATER COMPANY	HARRIS	234	308	381	453	525	596		P
H	DEER PARK	HARRIS	29,513	30,480	31,432	32,374	33,309	34,241		
H	EL DORADO UD	HARRIS	3,350	3,737	4,118	4,495	4,870	5,243		
H	EL LAGO	HARRIS	3,075	3,075	3,075	3,075	3,075	3,075		
H	FOUNTAINVIEW SUBDIVISION	HARRIS	2,984	3,510	4,027	4,539	5,048	5,555		
H	FRIENDSWOOD	HARRIS	7,800	7,800	7,800	7,800	7,800	7,800		P
H	GALENA PARK	HARRIS	11,099	11,592	12,077	12,557	13,034	13,510		
H	GREEN TRAILS MUD	HARRIS	2,694	3,084	3,468	3,848	4,225	4,601		
H	HARRIS COUNTY FWSD #47	HARRIS	4,290	4,290	4,290	4,290	4,290	4,290		
H	HARRIS COUNTY FWSD #51	HARRIS	18,866	18,866	18,866	18,866	18,866	18,866		
H	HARRIS COUNTY FWSD #6	HARRIS	3,722	4,424	5,115	5,799	6,479	7,156		
H	HARRIS COUNTY MUD #11	HARRIS	2,905	3,354	3,796	4,233	4,668	5,101		
H	HARRIS COUNTY MUD #119 INWOOD NORTH	HARRIS	8,079	8,725	8,725	8,725	8,725	8,725		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	HARRIS COUNTY MUD #132	HARRIS	9,436	11,844	14,212	16,556	18,885	21,206		
H	HARRIS COUNTY MUD #151	HARRIS	7,392	7,392	7,392	7,392	7,392	7,392		
H	HARRIS COUNTY MUD #152	HARRIS	5,956	7,800	9,614	11,410	13,195	14,973		
H	HARRIS COUNTY MUD #153	HARRIS	6,887	9,491	12,053	14,589	17,109	19,619		
H	HARRIS COUNTY MUD #154	HARRIS	6,485	8,141	9,769	11,381	12,983	14,579		
H	HARRIS COUNTY MUD #158	HARRIS	5,487	7,015	7,015	7,015	7,015	7,015		
H	HARRIS COUNTY MUD #180	HARRIS	5,339	6,616	7,872	9,115	10,351	11,582		
H	HARRIS COUNTY MUD #189	HARRIS	6,588	8,169	9,724	11,263	12,792	14,316		
H	HARRIS COUNTY MUD #261	HARRIS	1,374	1,374	1,374	1,374	1,374	1,374		
H	HARRIS COUNTY MUD #345	HARRIS	5,285	5,285	5,285	5,285	5,285	5,285		
H	HARRIS COUNTY MUD #46	HARRIS	6,326	6,326	6,326	6,326	6,326	6,326		
H	HARRIS COUNTY MUD #5	HARRIS	4,062	4,062	4,062	4,062	4,062	4,062		
H	HARRIS COUNTY MUD #50	HARRIS	3,334	3,612	3,885	4,156	4,425	4,693		
H	HARRIS COUNTY MUD #53	HARRIS	17,972	22,637	27,225	31,767	36,281	40,778		
H	HARRIS COUNTY MUD #55	HARRIS	11,556	11,556	11,556	11,556	11,556	11,556		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	HARRIS COUNTY MUD #8	HARRIS	6,225	6,961	7,685	8,402	9,114	9,823		
H	HARRIS COUNTY UD #14	HARRIS	1,699	1,871	2,040	2,208	2,375	2,541		
H	HARRIS COUNTY UD #15	HARRIS	3,259	3,792	4,316	4,835	5,351	5,865		
H	HARRIS COUNTY WCID #1	HARRIS	9,665	11,283	12,874	14,449	16,014	17,573		
H	HARRIS COUNTY WCID #133	HARRIS	4,577	4,652	4,727	4,802	4,877	4,877		
H	HARRIS COUNTY WCID #21	HARRIS	10,120	10,724	11,318	11,906	12,490	13,072		
H	HARRIS COUNTY WCID #36	HARRIS	10,451	11,572	12,674	13,765	14,849	15,929		
H	HARRIS COUNTY WCID #50	HARRIS	4,700	5,284	5,859	6,428	6,993	7,556		
H	HARRIS COUNTY WCID #76	HARRIS	1,788	1,788	1,788	1,788	1,788	1,788		
H	HARRIS COUNTY WCID #84	HARRIS	2,475	2,519	2,562	2,605	2,648	2,691		
H	HEDWIG VILLAGE	HARRIS	2,334	2,334	2,334	2,334	2,334	2,334		
H	HILSHIRE VILLAGE	HARRIS	770	770	770	770	770	770		
H	HOUSTON	HARRIS	2,199,988	2,472,783	2,741,099	3,006,695	3,270,641	3,533,585		P
H	HUMBLE	HARRIS	16,862	19,085	21,272	23,436	25,587	27,730		
H	HUNTERS CREEK VILLAGE	HARRIS	4,755	5,126	5,491	5,852	6,211	6,568		
H	JACINTO CITY	HARRIS	11,171	12,017	12,849	13,673	14,492	15,308		
H	JERSEY VILLAGE	HARRIS	8,742	10,555	12,338	14,103	15,857	17,604		
H	KATY	HARRIS	17,294	21,438	25,513	29,547	33,556	37,550		P
H	LA PORTE	HARRIS	35,467	38,960	42,394	45,794	49,173	52,539		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	LEAGUE CITY	HARRIS	180	185	190	195	200	205		P
H	LONGHORN TOWN UD	HARRIS	1,907	2,753	3,585	4,409	5,228	6,044		
H	MASON CREEK UD	HARRIS	9,050	9,050	9,050	9,050	9,050	9,050		
H	MISSOURI CITY	HARRIS	6,887	8,243	9,577	10,898	12,210	13,517		P
H	NASSAU BAY	HARRIS	4,170	4,170	4,170	4,170	4,170	4,170		
H	NFBWA (CRU)	HARRIS	6,954	6,824	6,875	7,244	7,469	7,429		
H	NHCRWA (CRU)	HARRIS	602,401	723,186	816,772	868,302	892,569	915,347		
H	NORTH BELT UD	HARRIS	3,916	5,197	6,457	7,705	8,945	10,180		
H	NORTH GREEN MUD	HARRIS	3,503	3,935	4,359	4,779	5,197	5,613		
H	NORTHWEST HARRIS COUNTY MUD #23	HARRIS	4,482	5,700	6,898	8,084	9,262	10,436		
H	NORTHWEST PARK MUD	HARRIS	24,031	29,106	29,992	29,992	29,992	29,992		
H	PARKWAY UD	HARRIS	2,911	2,932	2,953	2,974	2,994	3,014		
H	PASADENA	HARRIS	161,678	181,156	200,314	219,278	238,124	256,898		
H	PEARLAND	HARRIS	3,074	3,606	4,129	4,647	5,161	5,673		P
H	PINE TRAILS UTILITY	HARRIS	6,166	6,763	7,350	7,931	8,508	9,083		
H	PINEY POINT VILLAGE	HARRIS	3,546	3,708	3,867	4,024	4,180	4,336		
H	ROLLING FORK PUD	HARRIS	2,453	2,571	2,689	2,808	2,926	3,044		
H	SEABROOK	HARRIS	11,943	14,377	16,771	19,141	21,496	23,842		
H	SHOREACRES	HARRIS	1,644	1,796	1,945	2,093	2,093	2,093		
H	SOUTH HOUSTON	HARRIS	17,307	18,742	20,153	21,550	22,938	24,321		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	SOUTHSIDE PLACE	HARRIS	1,686	1,822	1,956	2,088	2,220	2,351		
H	SOUTHWEST UTILITIES	HARRIS	6,341	7,321	8,285	9,239	10,187	11,131	P	P
H	SPRING VALLEY	HARRIS	3,810	4,003	4,193	4,381	4,568	4,754		
H	STAFFORD	HARRIS	313	316	319	322	325	328		P
H	SUNBELT FWSD	HARRIS	24,141	28,628	33,041	37,409	41,750	46,075		
H	TAYLOR LAKE VILLAGE	HARRIS	5,472	5,472	5,472	5,472	5,472	5,472		
H	TOMBALL	HARRIS	12,059	15,429	18,150	22,954	26,554	31,650		
H	TRAIL OF THE LAKES MUD	HARRIS	10,970	10,970	10,970	10,970	10,970	10,970		
H	WALLER	HARRIS	586	778	967	1,154	1,340	1,525		P
H	WEBSTER	HARRIS	13,076	16,964	20,788	24,573	28,334	32,081		
H	WEST HARRIS COUNTY MUD #6	HARRIS	3,500	3,500	3,500	3,500	3,500	3,500		
H	WEST UNIVERSITY PL.	HARRIS	15,381	16,520	17,641	18,750	19,852	20,950		
H	WHCRWA (CRU)	HARRIS	317,303	367,954	406,962	434,507	444,915	448,101		P
H	WILLOW RUN SUBDIVISION	HARRIS	3,663	3,663	3,663	3,663	3,663	3,663		
H	WINDFERN FOREST UD	HARRIS	6,584	8,622	8,622	8,622	8,622	8,622		
H	WOODCREEK MUD	HARRIS	3,605	4,784	5,944	7,092	8,233	9,369		
		HARRIS Total	**4,078,231**	**4,629,335**	**5,180,439**	**5,731,543**	**6,282,647**	**6,833,751**		
H	BUFFALO	LEON	2,074	2,345	2,506	2,516	2,501	2,521		
H	CENTERVILLE	LEON	1,002	1,101	1,160	1,164	1,158	1,165		
H	COUNTY-OTHER	LEON	7,981	8,654	9,054	9,079	9,042	9,094		
H	FLO COMMUNITY WSC	LEON	5,335	6,894	7,820	7,878	7,791	7,908	P	P

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	JEWETT	LEON	1,071	1,281	1,405	1,413	1,401	1,417		
H	NORMANGEE	LEON	768	862	918	921	916	923		P
		LEON Total	**18,231**	**21,137**	**22,863**	**22,971**	**22,809**	**23,028**		
H	AMES	LIBERTY	1,338	1,623	1,897	2,165	2,459	2,789		
H	CLEVELAND	LIBERTY	7,930	8,288	8,631	8,967	9,336	9,749		
H	COUNTY-OTHER	LIBERTY	47,092	55,419	63,407	71,232	79,811	89,424		
H	DAISETTA	LIBERTY	1,078	1,127	1,173	1,219	1,268	1,324		
H	DAYTON	LIBERTY	7,491	9,454	11,336	13,180	15,201	17,467		
H	HARDIN	LIBERTY	885	1,028	1,165	1,299	1,446	1,611		
H	HARDIN WSC	LIBERTY	3,184	3,828	4,445	5,050	5,713	6,456		
H	KENEFICK	LIBERTY	824	997	1,163	1,325	1,503	1,702		
H	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO.	LIBERTY	1,670	1,880	2,081	2,278	2,494	2,736	P	P
H	LIBERTY	LIBERTY	8,265	8,520	8,765	9,005	9,268	9,563		
H	MERCY WSC	LIBERTY	404	482	557	630	710	800		P
H	PLUM GROVE	LIBERTY	1,234	1,569	1,890	2,205	2,550	2,937		
H	SOUTHWEST UTILITIES	LIBERTY	123	148	172	196	222	251	P	P
H	WEST HARDIN WSC	LIBERTY	412	535	653	768	894	1,036	P	P
		LIBERTY Total	**81,930**	**94,898**	**107,335**	**119,519**	**132,875**	**147,845**		
H	COUNTY-OTHER	MADISON	9,413	10,092	10,632	11,137	11,584	11,976		
H	MADISONVILLE	MADISON	4,442	4,725	4,951	5,162	5,349	5,512		
H	NORMANGEE	MADISON	50	56	61	65	69	72		P
		MADISON Total	**13,905**	**14,873**	**15,644**	**16,364**	**17,002**	**17,560**		
H	CONROE	MONTGOMERY	59,845	78,924	102,013	127,459	161,024	200,007		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. [1)]	County Split Pop. [2)]
H	CONSUMERS WATER INC	MONTGOMERY	2,351	2,673	3,397	4,246	5,368	6,672		P
H	COUNTY-OTHER	MONTGOMERY	166,298	200,411	288,084	392,511	540,106	711,645		
H	CRYSTAL SPRNGS WATER COMPANY	MONTGOMERY	6,670	7,945	10,814	14,182	18,629	23,798		P
H	CUT AND SHOOT	MONTGOMERY	1,515	1,733	2,159	2,655	3,309	4,068		
H	EAST PLANTATION UD	MONTGOMERY	2,398	2,839	3,831	4,995	6,532	8,318		
H	H M W SUD	MONTGOMERY	11,464	12,796	15,791	19,305	23,947	29,342		
H	HOUSTON	MONTGOMERY	1,096	1,486	2,248	3,134	4,303	5,661		P
H	MAGNOLIA	MONTGOMERY	2,151	3,012	4,054	5,203	6,718	8,478		
H	MONTGOMERY	MONTGOMERY	1,200	5,000	7,500	10,000	12,500	15,000		
H	MONTGOMERY COUNTY MUD #18	MONTGOMERY	6,928	8,840	13,139	18,185	24,848	32,592		
H	MONTGOMERY COUNTY MUD #19	MONTGOMERY	3,200	3,200	3,200	3,200	3,200	3,200		
H	MONTGOMERY COUNTY MUD #8	MONTGOMERY	4,060	5,336	6,532	6,967	6,886	6,829		
H	MONTGOMERY COUNTY MUD #9	MONTGOMERY	2,840	3,864	4,968	5,478	5,559	5,616		
H	MONTGOMERY COUNTY UD #2	MONTGOMERY	3,116	3,116	3,116	3,116	3,116	3,116		
H	MONTGOMERY COUNTY UD #3	MONTGOMERY	3,726	3,976	4,537	5,197	6,069	7,081		
H	MONTGOMERY COUNTY UD #4	MONTGOMERY	4,972	4,972	4,972	4,972	4,972	4,972		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	MONTGOMERY COUNTY WCID #1	MONTGOMERY	4,157	4,448	5,100	5,867	6,879	8,055		
H	NEW CANEY MUD	MONTGOMERY	15,154	17,712	23,465	30,218	39,135	49,499		
H	OAK RIDGE NORTH	MONTGOMERY	3,743	4,202	5,100	6,144	7,521	9,120		
H	PANORAMA VILLAGE	MONTGOMERY	2,160	2,281	2,402	2,523	2,644	2,765		
H	PATTON VILLAGE	MONTGOMERY	1,721	1,923	2,318	2,777	3,382	4,085		
H	POINT AQUARIUS MUD	MONTGOMERY	3,558	4,429	6,388	8,686	11,722	15,250		
H	PORTER WSC	MONTGOMERY	15,087	17,179	21,887	27,412	27,412	27,412		
H	RAYFORD ROAD MUD	MONTGOMERY	18,237	18,237	18,237	18,237	18,237	18,237		
H	RIVER PLANTATION MUD	MONTGOMERY	3,310	3,310	3,310	3,310	3,310	3,310		
H	ROMAN FOREST	MONTGOMERY	4,372	6,934	10,035	13,452	17,959	23,194		
H	SHENANDOAH	MONTGOMERY	5,123	5,999	7,059	8,228	9,770	11,560		
H	SOUTHERN MONTGOMERY COUNTY MUD	MONTGOMERY	11,087	14,196	14,481	15,034	15,213	15,568		
H	SOUTHWEST UTILITIES	MONTGOMERY	2,263	2,582	3,299	4,141	5,253	6,545	P	P
H	SPLENDORA	MONTGOMERY	2,017	2,470	3,356	4,386	5,745	7,323		
H	SPRING CREEK UD	MONTGOMERY	5,326	6,271	8,397	10,892	14,186	18,015		
H	STAGECOACH	MONTGOMERY	626	861	1,185	1,630	2,243	3,086		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	STANLEY LAKE MUD	MONTGOMERY	4,256	5,201	5,201	5,201	5,201	5,201		
H	THE WOODLANDS	MONTGOMERY	60,080	111,470	119,300	119,300	119,300	119,300		
H	WILLIS	MONTGOMERY	5,695	6,739	8,780	11,153	14,283	17,918		
H	WOODBRANCH	MONTGOMERY	1,567	1,784	2,047	2,336	2,718	3,161		
		MONTGOMERY Total	**453,369**	**588,351**	**751,702**	**931,732**	**1,169,199**	**1,444,999**		
H	COUNTY-OTHER	POLK	11,800	12,789	13,538	14,167	14,984	15,747	P	
H	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO.	POLK	13,706	15,319	16,590	17,577	18,632	19,641	P	P
H	LIVINGSTON	POLK	6,740	8,025	9,061	9,829	10,539	11,232		
H	ONALASKA	POLK	1,562	1,944	2,252	2,480	2,691	2,897		
H	ONALASKA WSC	POLK	3,764	4,029	4,238	4,400	4,573	4,739		
H	TRINITY RURAL WSC	POLK	78	90	100	108	116	124		P
		POLK Total	**37,650**	**42,196**	**45,779**	**48,561**	**51,535**	**54,380**		
H	COLDSPRING	SAN JACINTO	826	958	1,064	1,130	1,168	1,186		
H	COUNTY-OTHER	SAN JACINTO	11,185	12,620	13,664	13,758	13,788	13,519		
H	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO.	SAN JACINTO	4,632	5,822	6,773	7,366	7,710	7,866	P	P
H	MERCY WSC	SAN JACINTO	1,820	2,211	2,523	2,718	2,831	2,882		P
H	POINT BLANK	SAN JACINTO	662	763	843	893	922	935		
H	RIVERSIDE WSC	SAN JACINTO	2,017	2,542	3,066	3,950	4,485	5,011		P
H	SAN JACINTO WSC	SAN JACINTO	3,697	4,457	5,065	5,444	5,663	5,763		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	SHEPHERD	SAN JACINTO	2,604	3,168	3,619	3,900	4,063	4,137		
		SAN JACINTO Total	**27,443**	**32,541**	**36,617**	**39,159**	**40,630**	**41,299**		
H	COUNTY-OTHER	TRINITY	2,866	3,092	3,167	3,129	3,005	2,891	P	
H	GROVETON	TRINITY	630	680	696	688	660	635	P	
H	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO.	TRINITY	1,673	1,805	1,849	1,826	1,754	1,688	P	P
H	TRINITY	TRINITY	3,033	3,273	3,352	3,311	3,180	3,060		
H	TRINITY RURAL WSC	TRINITY	3,369	3,635	3,722	3,677	3,532	3,399		P
		TRINITY Total	**11,571**	**12,485**	**12,786**	**12,631**	**12,131**	**11,673**		
H	CONSOLIDATED WSC	WALKER	100	110	115	113	114	114	P	P
H	COUNTY-OTHER	WALKER	14,072	10,692	11,536	10,062	9,791	9,246		
H	HUNTSVILLE	WALKER	42,888	52,424	54,405	54,405	54,405	54,405		
H	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE CO.	WALKER	439	484	506	501	502	502	P	P
H	NEW WAVERLY	WALKER	1,087	1,199	1,252	1,239	1,242	1,242		
H	RIVERSIDE WSC	WALKER	4,472	4,612	4,819	5,550	5,985	6,530		P
H	TRINITY RURAL WSC	WALKER	267	294	307	304	305	305		P
H	WALKER COUNTY RURAL WSC	WALKER	7,347	8,100	8,462	8,373	8,393	8,393		
		WALKER Total	**70,672**	**77,915**	**81,402**	**80,547**	**80,737**	**80,737**		
H	BROOKSHIRE	WALLER	4,616	5,997	7,535	9,246	11,284	13,624		
H	COUNTY-OTHER	WALLER	19,737	23,271	27,206	31,585	36,797	42,787		

REGION	WATER USER GROUP	COUNTY NAME	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. 1)	County Split Pop. 2)
H	HEMPSTEAD	WALLER	7,389	10,585	14,143	18,102	22,817	28,232		
H	KATY	WALLER	1,462	2,241	3,109	4,074	5,224	6,544		P
H	PINE ISLAND	WALLER	1,102	1,402	1,736	2,107	2,549	3,057		
H	PRAIRIE VIEW	WALLER	4,780	5,217	5,704	6,247	6,893	7,634		
H	WALLER	WALLER	2,051	2,462	2,919	3,428	4,034	4,730		P
		WALLER Total	**41,137**	**51,175**	**62,352**	**74,789**	**89,598**	**106,608**		
		REGION H TOTAL	**6,020,078**	**7,001,144**	**7,986,480**	**8,998,002**	**10,132,237**	**11,346,082**		

1) If "P" is present in this column, the Water User Group (WUG) is located in more than one Region and the projections listed in the row represent only the WUG's population projections within that particular Region, not the WUG's total population projections. If the "P" is present for a county total entry, then the county has been split by Regional boundaries and the projections listed in the row represent only the county's populations within the particular Region, not the county's total population projections.

2) If "P" is present in this column, the Water User Group (WUG) is located in more than one county and the projections listed in the row represent only the WUG's population projections within that particular county, not the WUG's total population projections.

Projections last updated 06/09/2009

Table 2-5
Water Demand by City and Category

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
BELLVILLE	BRAZOS	AUSTIN	080048000	1,192	1,477	1,664	1,760	1,810	1,889
COUNTY-OTHER	BRAZOS	AUSTIN	080757008	1,047	871	762	692	659	624
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	080757008	281	307	326	334	338	347
COUNTY-OTHER	COLORADO	AUSTIN	080757008	26	29	31	31	32	33
IRRIGATION	BRAZOS	AUSTIN	081004008	743	743	743	743	743	743
IRRIGATION	BRAZOS-COLORADO	AUSTIN	081004008	9,874	9,874	9,874	9,874	9,874	9,874
LIVESTOCK	BRAZOS	AUSTIN	081005008	1,211	1,211	1,211	1,211	1,211	1,211
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	081005008	339	339	339	339	339	339
LIVESTOCK	COLORADO	AUSTIN	081005008	65	65	65	65	65	65
MANUFACTURING	BRAZOS	AUSTIN	081001008	172	191	208	223	236	257
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	081001008	38	42	45	49	52	56
MINING	BRAZOS	AUSTIN	081003008	40	44	47	49	51	53
MINING	BRAZOS-COLORADO	AUSTIN	081003008	4	4	4	4	5	5
MINING	COLORADO	AUSTIN	081003008	7	8	8	9	9	9
SAN FELIPE	BRAZOS	AUSTIN	080954000	124	145	159	167	170	176
SEALY	BRAZOS	AUSTIN	080549000	1,275	1,635	1,883	2,000	2,060	2,163
WALLIS	BRAZOS-COLORADO	AUSTIN	080630000	178	194	202	207	209	214
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	080013000	3,123	3,293	3,440	3,557	3,743	3,970
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	080018000	2,218	2,225	2,243	2,249	2,307	2,394
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	080817000	15	15	15	16	17	17
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	080817000	75	78	80	82	85	90
BRAZORIA	BRAZOS	BRAZORIA	084034000	74	73	72	70	70	71
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	084034000	229	226	222	215	216	220
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	084027000	842	1,214	1,587	1,911	2,271	2,648
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	084031000	1,115	1,590	2,050	2,462	2,909	3,376
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	084032000	603	872	1,139	1,372	1,631	1,902
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	084033000	578	570	562	558	558	558
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	084034000	680	669	659	653	653	653
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	080078000	266	296	323	348	378	413
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	080118000	1,181	1,214	1,265	1,291	1,349	1,425
COUNTY-OTHER	BRAZOS	BRAZORIA	080757020	126	131	138	143	151	160
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	080757020	4,237	4,492	4,749	4,955	5,218	5,517
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	080757020	10,073	11,038	12,233	13,230	14,407	15,715
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	080693000	211	222	231	238	250	265
FREEPORT	BRAZOS	BRAZORIA	080217000	140	135	132	130	129	129
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	080217000	1,752	2,057	2,366	2,633	2,936	3,281
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	080881000	125	126	126	127	130	133

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	080779000	92	91	90	89	90	94
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	080885000	108	118	126	135	145	156
IRRIGATION	BRAZOS	BRAZORIA	081004020	4,186	3,816	3,675	3,589	3,589	3,589
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	081004020	5,536	5,048	4,860	4,747	4,747	4,747
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	081004020	125,311	114,251	110,009	107,452	107,452	107,452
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	080308000	98	91	84	76	72	72
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	080338000	4,015	4,332	4,611	4,883	5,210	5,595
LIVESTOCK	BRAZOS	BRAZORIA	081005020	242	242	242	242	242	242
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	081005020	404	404	404	404	404	404
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	081005020	968	968	968	968	968	968
MANUFACTURING	BRAZOS	BRAZORIA	081001020	216,824	238,749	258,151	277,737	295,021	315,974
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	081001020	1,184	1,304	1,410	1,517	1,611	1,726
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	081001020	42,231	46,501	50,280	54,094	57,461	61,541
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	080721000	526	511	496	480	470	470
MINING	BRAZOS	BRAZORIA	081003020	307	337	354	372	389	405
MINING	BRAZOS-COLORADO	BRAZORIA	081003020	2,852	3,128	3,292	3,452	3,614	3,766
MINING	SAN JACINTO-BRAZOS	BRAZORIA	081003020	945	1,037	1,091	1,145	1,198	1,248
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	084294000	47	55	63	71	79	88
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	084294000	386	451	514	575	638	712
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	080730000	166	188	210	229	251	277
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	080457000	11,965	14,925	17,508	19,949	22,681	25,525
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	080501000	341	354	363	370	386	408
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	084343000	71	73	75	77	79	83
SURFSIDE BEACH	BRAZOS	BRAZORIA	080967000	168	189	209	228	248	271
SWEENY	BRAZOS-COLORADO	BRAZORIA	080590000	606	636	663	684	717	757
VARNER CREEK UD	BRAZOS	BRAZORIA	084370000	359	428	494	556	622	694
WEST COLUMBIA	BRAZOS	BRAZORIA	080640000	481	457	434	413	395	385
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	080640000	92	88	84	79	76	74
ANAHUAC	NECHES-TRINITY	CHAMBERS	080015000	274	292	307	318	334	353
ANAHUAC	TRINITY	CHAMBERS	080015000	79	84	89	92	97	102
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	080042000	606	661	712	752	802	859
BEACH CITY	TRINITY	CHAMBERS	080822000	39	51	62	72	82	93
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	080822000	275	362	439	507	580	654
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	080757036	50	48	46	44	43	42
COUNTY-OTHER	TRINITY	CHAMBERS	080757036	251	240	230	220	213	210
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	080757036	162	155	148	142	137	135
IRRIGATION	NECHES-TRINITY	CHAMBERS	081004036	83,269	83,269	83,269	83,269	83,269	83,269
IRRIGATION	TRINITY	CHAMBERS	081004036	32,741	32,741	32,741	32,741	32,741	32,741
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	081004036	1,767	1,767	1,767	1,767	1,767	1,767
LIVESTOCK	NECHES-TRINITY	CHAMBERS	081005036	333	333	333	333	333	333

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
LIVESTOCK	TRINITY	CHAMBERS	081005036	60	60	60	60	60	60
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	081005036	69	69	69	69	69	69
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	081001036	11,802	12,959	13,987	15,011	15,932	17,122
MINING	NECHES-TRINITY	CHAMBERS	081003036	639	692	725	756	788	816
MINING	TRINITY	CHAMBERS	081003036	28,240	30,587	32,017	33,420	34,811	36,027
MINING	TRINITY-SAN JACINTO	CHAMBERS	081003036	8,543	9,253	9,685	10,110	10,531	10,899
MONT BELVIEU	TRINITY	CHAMBERS	080413000	669	870	1,055	1,215	1,382	1,553
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	080413000	314	408	494	570	648	728
OLD RIVER-WINFREE	TRINITY	CHAMBERS	080727000	208	225	238	248	263	280
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	081002036	4,435	3,536	4,134	4,863	5,751	6,834
TRINITY BAY CONSERVATION DISTRICT	NECHES-TRINITY	CHAMBERS	084355000	1,412	1,686	1,940	2,167	2,392	2,644
TRINITY BAY CONSERVATION DISTRICT	TRINITY	CHAMBERS	084355000	646	772	888	991	1,094	1,210
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	080998000	403	434	474	514	566	622
BEASLEY	BRAZOS	FORT BEND	081012000	8	9	10	12	14	16
BEASLEY	BRAZOS-COLORADO	FORT BEND	081012000	84	95	108	122	142	166
COUNTY-OTHER	BRAZOS	FORT BEND	080757079	2,728	1,102	4,855	9,655	19,248	30,655
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	080757079	221	67	177	235	313	334
COUNTY-OTHER	SAN JACINTO	FORT BEND	080757079	114	93	117	618	1,914	3,386
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	080757079	502	463	372	4,110	12,370	21,545
FAIRCHILDS	BRAZOS	FORT BEND	081019000	406	515	650	787	971	1,182
FIRST COLONY MUD #9	BRAZOS	FORT BEND	084113000	1,392	1,425	1,467	1,508	1,559	1,609
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	084117000	968	960	960	957	957	957
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	084118000	587	577	574	571	571	571
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	084119000	780	772	772	769	769	769
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	084119000	1,426	2,018	2,016	2,016	2,017	2,017
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	084122000	1,587	2,224	3,009	3,803	4,877	6,104
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	084126000	830	821	816	813	813	813
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	084127000	604	600	600	600	600	600
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	084128000	479	479	477	477	477	477
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	084129000	773	1,033	1,349	1,675	2,108	2,602
FULSHEAR	BRAZOS	FORT BEND	080869000	211	267	335	404	496	603
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	080869000	138	174	219	264	323	394
HOUSTON	SAN JACINTO	FORT BEND	080285000	4,068	4,667	5,386	6,136	7,166	8,391
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	080285000	2,857	3,277	3,782	4,310	5,033	5,893
IRRIGATION	BRAZOS	FORT BEND	081004079	17,907	17,907	17,907	17,907	17,907	17,907
IRRIGATION	BRAZOS-COLORADO	FORT BEND	081004079	18,869	18,869	18,869	18,869	18,869	18,869
IRRIGATION	SAN JACINTO	FORT BEND	081004079	7,538	7,538	7,538	7,538	7,538	7,538
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	081004079	9,141	9,141	9,141	9,141	9,141	9,141

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
KATY	SAN JACINTO	FORT BEND	080312000	287	374	484	597	745	919
KENDLETON	BRAZOS-COLORADO	FORT BEND		151	194	251	324	418	539
LIVESTOCK	BRAZOS	FORT BEND	081005079	691	691	691	691	691	691
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	081005079	211	211	211	211	211	211
LIVESTOCK	SAN JACINTO	FORT BEND	081005079	70	70	70	70	70	70
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	081005079	199	199	199	199	199	199
MANUFACTURING	BRAZOS	FORT BEND	081001079	1,235	1,296	1,344	1,383	1,409	1,334
MANUFACTURING	SAN JACINTO	FORT BEND	081001079	1,979	2,076	2,154	2,216	2,258	2,137
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	081001079	3,649	3,827	3,970	4,086	4,162	3,939
MEADOWS	SAN JACINTO	FORT BEND	080792000	1,887	1,859	1,838	1,817	1,809	1,809
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	080792000	188	185	183	181	180	180
MINING	BRAZOS	FORT BEND	081003079	618	630	638	644	651	656
MINING	BRAZOS-COLORADO	FORT BEND	081003079	140	144	144	146	147	149
MINING	SAN JACINTO	FORT BEND	081003079	280	285	289	292	295	297
MINING	SAN JACINTO-BRAZOS	FORT BEND	081003079	1,972	2,011	2,034	2,056	2,076	2,094
MISSOURI CITY	BRAZOS	FORT BEND	080409000	315	390	466	545	603	733
MISSOURI CITY	SAN JACINTO	FORT BEND	080409000	2,577	3,195	3,817	4,460	4,938	6,004
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	080409000	11,664	14,464	17,280	20,186	22,351	27,175
NEEDVILLE	BRAZOS	FORT BEND	080428000	207	250	304	359	436	527
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	080428000	250	303	368	435	527	637
NFBWA	BRAZOS	FORT BEND		1,295	2,064	3,050	4,195	5,963	8,180
NFBWA	SAN JACINTO	FORT BEND		18,990	25,343	30,378	33,901	34,839	34,633
NFBWA	SAN JACINTO-BRAZOS	FORT BEND		12,739	27,399	38,659	48,881	58,080	66,749
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	084294000	15	16	18	20	22	25
PECAN GROVE MUD #1	BRAZOS	FORT BEND	084299000	2,301	2,321	2,339	2,368	2,441	2,539
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	084299000	612	617	622	629	649	675
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	084303000	573	554	544	534	530	530
PLEAK	BRAZOS	FORT BEND	081053000	547	646	770	895	1,063	1,256
RICHMOND	BRAZOS	FORT BEND	080500000	2,252	2,324	2,764	3,189	3,915	4,717
ROSENBERG	BRAZOS	FORT BEND	080518000	5,156	6,405	7,932	9,502	11,637	14,171
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	084334000	1,061	1,212	1,212	1,205	1,205	1,205
SIMONTON	BRAZOS	FORT BEND	081062000	419	497	592	689	816	967
STAFFORD	SAN JACINTO	FORT BEND	080577000	333	434	552	677	852	1,052
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	080577000	1,395	1,820	2,317	2,839	3,573	4,411
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	081002079	66,026	68,046	79,553	93,582	110,682	131,527
SUGAR LAND	BRAZOS	FORT BEND	080585000	8,223	9,859	10,111	10,063	10,063	10,063
SUGAR LAND	SAN JACINTO	FORT BEND	080585000	824	987	1,013	1,008	1,008	1,008
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	080585000	11,234	13,468	13,813	13,747	13,747	13,747
WHCRWA	SAN JACINTO	FORT BEND	088002000	3,208	3,771	4,350	5,089	5,819	6,532
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	084012000	552	572	569	560	557	562

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	080759000	429	458	471	475	478	482
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	084027000	1,123	1,201	1,240	1,251	1,261	1,272
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	080764000	282	287	289	287	287	289
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	080757084	0	0	1	0	0	1
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	080757084	1,098	948	850	795	764	749
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	080165000	3,085	3,416	3,586	3,620	3,657	3,699
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	080219000	3,245	3,532	3,652	3,638	3,666	3,707
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	084136000	16,095	15,903	15,711	15,518	15,390	15,390
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	084135000	426	483	514	525	532	540
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	084136000	267	296	312	316	320	324
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	080279000	933	935	930	914	911	915
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	081004084	10,342	10,342	10,342	10,342	10,342	10,342
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	080886000	300	344	368	377	383	389
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	080316000	278	322	348	356	360	366
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	080342000	2,161	2,115	2,069	2,023	1,992	1,992
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	080350000	7,477	8,253	8,674	8,751	8,840	8,947
LIVESTOCK	NECHES-TRINITY	GALVESTON	081005084	16	16	16	16	16	16
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	081005084	309	309	309	309	309	309
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	081001084	41,005	44,330	47,046	49,692	51,967	55,491
MINING	NECHES-TRINITY	GALVESTON	081003084	136	143	147	150	154	158
MINING	SAN JACINTO-BRAZOS	GALVESTON	081003084	129	136	139	143	146	149
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	084329000	632	670	680	676	677	684
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	080743000	988	990	982	956	951	956
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	081002084	5,034	4,013	4,692	5,519	6,528	7,757
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	080602000	6,476	6,383	6,269	6,138	6,051	6,056
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	080973000	243	282	303	311	316	321
BAYTOWN	SAN JACINTO	HARRIS	080042000	624	625	628	631	643	659
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	080042000	10,531	10,537	10,599	10,645	10,841	11,114
BELLAIRE	SAN JACINTO	HARRIS	080046000	3,734	3,993	4,254	4,527	4,817	5,131
BLUE BELL MANOR UTILITY COMPANY	SAN JACINTO	HARRIS	084026000	572	563	555	546	540	540
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	084036000	471	550	626	705	783	864
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	080085000	1,504	1,491	1,479	1,466	1,462	1,462
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	084043000	451	530	610	691	770	853
CHCRWA	SAN JACINTO	HARRIS		4,637	6,433	6,433	6,433	6,433	6,433
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	084053000	668	646	625	618	611	611
CLEAR BROOK CITY MUD WOODMEADOWS	SAN JACINTO	HARRIS	084063000	1,003	1,089	1,189	1,281	1,384	1,503
CONSUMERS WATER INC	SAN JACINTO	HARRIS	084072000	399	524	653	767	897	1,026

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
COUNTY-OTHER	SAN JACINTO	HARRIS	080757101	6,030	5,971	14,834	34,063	60,356	88,146
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	080757101	2,621	2,045	2,512	2,030	1,966	2,014
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	080757101	2,373	1,776	1,997	1,370	969	645
CROSBY MUD	SAN JACINTO	HARRIS	084078000	897	964	1,028	1,091	1,157	1,237
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	084081000	21	27	33	39	45	51
DEER PARK	SAN JACINTO	HARRIS	080154000	1,723	1,725	1,737	1,746	1,782	1,832
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	080154000	2,641	2,645	2,664	2,678	2,732	2,809
EL DORADO UD	SAN JACINTO	HARRIS	084101000	465	507	544	584	627	675
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	080695000	534	524	513	503	496	496
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	084132000	341	389	438	483	532	585
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	080219000	1,031	1,005	979	952	944	944
GALENA PARK	SAN JACINTO	HARRIS	080226000	1,231	1,234	1,245	1,252	1,285	1,332
GREEN TRAILS MUD	SAN JACINTO	HARRIS	084143000	917	1,036	1,158	1,276	1,396	1,520
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	084149000	423	408	394	380	370	370
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	084150000	2,536	2,473	2,451	2,409	2,409	2,409
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	084151000	346	396	441	494	544	601
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	084153000	417	470	523	574	627	686
HARRIS COUNTY MUD #119 INWOOD NORTH	SAN JACINTO	HARRIS	084151000	878	919	899	880	870	870
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	084157000	1,755	2,176	2,579	2,986	3,385	3,801
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	084159000	1,275	1,267	1,259	1,250	1,250	1,250
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	084160000	787	1,014	1,228	1,444	1,670	1,895
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	084161000	1,227	1,669	2,106	2,533	2,971	3,406
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	084162000	676	830	974	1,122	1,265	1,421
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	084165000	486	597	589	574	574	574
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	084170000	616	741	864	990	1,113	1,245
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	084174000	804	970	1,133	1,299	1,462	1,636
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	084179000	870	867	867	865	865	865
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	084182000	1,415	1,403	1,403	1,397	1,397	1,397
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	084183000	836	822	808	801	801	801
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	084187000	655	642	628	614	605	605
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	084185000	620	655	696	731	773	820
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	084186000	1,933	2,384	2,806	3,238	3,658	4,111
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	084187000	1,502	1,463	1,424	1,385	1,359	1,359
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	084189000	697	756	809	866	929	1,001
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	084190000	582	635	686	737	790	845
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	084191000	427	484	541	596	653	716
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	084195000	1,115	1,264	1,413	1,554	1,704	1,870
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	084195000	754	750	747	737	743	743

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	084196000	1,417	1,466	1,509	1,547	1,609	1,684
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	084197000	1,346	1,452	1,547	1,650	1,763	1,891
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	084198000	605	663	715	770	830	897
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	084199000	296	290	284	278	274	274
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	084200000	602	604	606	604	611	621
HEDWIG VILLAGE	SAN JACINTO	HARRIS	080269000	831	824	816	808	803	803
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	081025000	191	188	185	183	182	182
HOUSTON	SAN JACINTO	HARRIS	080285000	361,804	398,796	433,343	468,951	506,649	547,381
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	080285000	20,163	22,225	24,150	26,134	28,235	30,505
HUMBLE	SAN JACINTO	HARRIS	080289000	3,664	4,062	4,456	4,857	5,274	5,715
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	080290000	1,747	1,866	1,981	2,091	2,212	2,340
IRRIGATION	SAN JACINTO	HARRIS	081004101	9,883	9,883	9,883	9,883	9,883	9,883
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	081004101	5,417	5,417	5,417	5,417	5,417	5,417
JACINTO CITY	SAN JACINTO	HARRIS	080301000	1,301	1,346	1,410	1,455	1,526	1,612
JERSEY VILLAGE	SAN JACINTO	HARRIS	080709000	1,586	1,880	2,170	2,464	2,753	3,056
KATY	SAN JACINTO	HARRIS	080312000	3,197	3,867	4,544	5,230	5,902	6,604
LA PORTE	SAN JACINTO	HARRIS	080346000	287	306	328	346	369	394
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	080346000	5,036	5,367	5,750	6,066	6,461	6,904
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	080350000	26	26	26	26	27	27
LIVESTOCK	SAN JACINTO	HARRIS	081005101	951	951	951	951	951	951
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	081005101	91	91	91	91	91	91
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	081005101	91	91	91	91	91	91
LONGHORN TOWN UD	SAN JACINTO	HARRIS	084235000	596	857	1,112	1,368	1,622	1,875
MANUFACTURING	SAN JACINTO	HARRIS	081001101	256,465	275,094	290,934	304,964	315,464	310,194
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	081001101	66,918	71,779	75,911	79,572	82,312	80,937
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	081001101	72,614	77,888	82,373	86,345	89,318	87,826
MASON CREEK UD	SAN JACINTO	HARRIS	084247000	2,352	2,321	2,291	2,271	2,261	2,261
MINING	SAN JACINTO	HARRIS	081003101	1,258	1,407	1,500	1,593	1,688	1,771
MINING	SAN JACINTO-BRAZOS	HARRIS	081003101	24	27	29	31	32	34
MISSOURI CITY	SAN JACINTO	HARRIS	080409000	1,306	1,540	1,786	2,035	2,296	2,554
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	080424000	1,028	1,014	1,000	986	976	976
NFBWA	SAN JACINTO	HARRIS		1,636	1,566	1,557	1,626	1,660	1,640
NHCRWA	SAN JACINTO	HARRIS	088000000	116,062	136,903	152,789	161,456	164,968	169,178
NORTH BELT UD	SAN JACINTO	HARRIS	084275000	461	600	731	863	1,002	1,140
NORTH GREEN MUD	SAN JACINTO	HARRIS	084279000	349	379	405	434	466	503
NORTHWEST HARRIS COUNTY MUD #23	SAN JACINTO	HARRIS	084286000	587	728	873	1,005	1,152	1,298
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	084287000	2,909	3,423	3,427	3,359	3,326	3,326
PARKWAY UD	SAN JACINTO	HARRIS	084298000	303	296	288	280	275	277
PASADENA	SAN JACINTO	HARRIS	080456000	15,990	17,440	18,759	20,151	21,674	23,383

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
PASADENA	SAN JACINTO-BRAZOS	HARRIS	080456000	4,475	4,881	5,250	5,639	6,066	6,544
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	080457000	445	513	579	646	717	788
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	084302000	939	1,008	1,070	1,137	1,210	1,292
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	080468000	1,275	1,317	1,360	1,402	1,451	1,506
ROLLING FORK PUD	SAN JACINTO	HARRIS	084411000	706	729	753	777	806	839
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	080545000	2,421	2,867	3,288	3,731	4,166	4,620
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	080558000	204	217	229	239	237	237
SOUTH HOUSTON	SAN JACINTO	HARRIS	080569000	2,288	2,393	2,528	2,631	2,775	2,942
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	080572000	406	433	458	482	510	540
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	084343000	710	795	882	962	1,050	1,147
SPRING VALLEY	SAN JACINTO	HARRIS	080575000	888	915	944	972	1,008	1,049
STAFFORD	SAN JACINTO	HARRIS	080577000	23	23	23	22	23	23
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	081002101	7,284	22,585	26,405	31,062	36,738	43,656
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	081002101	444	1,377	1,610	1,893	2,239	2,661
SUNBELT FWSD	SAN JACINTO	HARRIS	084350000	4,489	5,227	5,922	6,663	7,389	8,154
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	080751000	908	889	871	852	846	846
TOMBALL	SAN JACINTO	HARRIS	080608000	2,621	3,301	3,842	4,834	5,562	6,630
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	084355000	1,413	1,376	1,364	1,339	1,339	1,339
WALLER	SAN JACINTO	HARRIS	080629000	119	154	190	225	260	296
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	080635000	2,417	3,097	3,772	4,432	5,110	5,786
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	084387000	565	561	561	549	541	541
WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	080643000	3,101	3,275	3,438	3,591	3,780	3,989
WHCRWA	SAN JACINTO	HARRIS	088002000	60,067	67,747	73,904	78,344	79,642	80,217
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	084398000	665	652	640	628	620	620
WINDFERN FOREST UD	SAN JACINTO	HARRIS	084401000	804	1,033	1,014	1,004	1,004	1,004
WOODCREEK MUD	SAN JACINTO	HARRIS	084404000	622	815	999	1,184	1,374	1,564
BUFFALO	TRINITY	LEON	080083000	348	384	401	397	392	395
CENTERVILLE	TRINITY	LEON	080105000	189	203	210	207	205	206
COUNTY-OTHER	BRAZOS	LEON	080757145	395	416	421	412	405	408
COUNTY-OTHER	TRINITY	LEON	080757145	428	448	452	443	436	439
FLO COMMUNITY WSC	TRINITY	LEON	084114000	418	525	578	574	559	567
IRRIGATION	TRINITY	LEON	081004145	542	542	542	542	542	542
JEWETT	BRAZOS	LEON	080887000	51	60	64	64	63	64
JEWETT	TRINITY	LEON	080887000	151	177	192	191	188	190
LIVESTOCK	BRAZOS	LEON	081005145	423	423	423	423	423	423
LIVESTOCK	TRINITY	LEON	081005145	1,268	1,268	1,268	1,268	1,268	1,268
MANUFACTURING	TRINITY	LEON	081001145	714	842	967	1,093	1,207	1,313
MINING	BRAZOS	LEON	081003145	221	213	209	205	201	198
MINING	TRINITY	LEON	081003145	1,296	1,251	1,226	1,204	1,183	1,166
NORMANGEE	BRAZOS	LEON	080927000	42	46	49	48	47	48

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
NORMANGEE	TRINITY	LEON	080927000	106	117	122	120	119	120
AMES	TRINITY	LIBERTY	080676000	137	159	179	197	221	250
CLEVELAND	SAN JACINTO	LIBERTY	080116000	1,341	1,365	1,392	1,416	1,464	1,529
COUNTY-OTHER	NECHES	LIBERTY	080757146	154	179	203	228	255	288
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	080757146	11	12	14	16	18	20
COUNTY-OTHER	SAN JACINTO	LIBERTY	080757146	1,294	1,504	1,707	1,918	2,145	2,427
COUNTY-OTHER	TRINITY	LIBERTY	080757146	2,787	3,116	3,441	3,786	4,157	4,628
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	080757146	187	217	247	277	310	350
DAISETTA	NECHES	LIBERTY	080149000	58	59	60	61	62	65
DAISETTA	TRINITY	LIBERTY	080149000	91	93	94	95	98	102
DAYTON	TRINITY	LIBERTY	080152000	1,737	2,161	2,553	2,924	3,355	3,855
HARDIN	TRINITY	LIBERTY	084148000	136	155	172	191	211	235
HARDIN WSC	TRINITY	LIBERTY	084148000	567	669	767	865	973	1,099
IRRIGATION	NECHES	LIBERTY	081004146	3,317	3,317	3,317	3,317	3,317	3,317
IRRIGATION	NECHES-TRINITY	LIBERTY	081004146	8,289	8,289	8,289	8,289	8,289	8,289
IRRIGATION	SAN JACINTO	LIBERTY	081004146	830	830	830	830	830	830
IRRIGATION	TRINITY	LIBERTY	081004146	53,056	53,056	53,056	53,056	53,056	53,056
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	081004146	17,409	17,409	17,409	17,409	17,409	17,409
KENEFICK	TRINITY	LIBERTY	081033000	94	112	128	144	162	183
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	LIBERTY	084226000	108	116	124	130	140	153
LIBERTY	TRINITY	LIBERTY	080356000	1,509	1,527	1,532	1,543	1,578	1,628
LIVESTOCK	NECHES	LIBERTY	081005146	104	104	104	104	104	104
LIVESTOCK	NECHES-TRINITY	LIBERTY	081005146	35	35	35	35	35	35
LIVESTOCK	SAN JACINTO	LIBERTY	081005146	140	140	140	140	140	140
LIVESTOCK	TRINITY	LIBERTY	081005146	446	446	446	446	446	446
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	081005146	32	32	32	32	32	32
MANUFACTURING	SAN JACINTO	LIBERTY	081001146	331	391	452	514	570	619
MANUFACTURING	TRINITY	LIBERTY	081001146	62	74	85	97	108	117
MERCY WSC	SAN JACINTO	LIBERTY	084253000	75	88	100	113	126	142
MINING	NECHES	LIBERTY	081003146	32	32	32	32	32	33
MINING	NECHES-TRINITY	LIBERTY	081003146	23	23	23	24	23	22
MINING	SAN JACINTO	LIBERTY	081003146	34	34	34	34	35	35
MINING	TRINITY	LIBERTY	081003146	4,924	4,937	4,945	4,951	4,958	4,963
MINING	TRINITY-SAN JACINTO	LIBERTY	081003146	3,717	3,727	3,732	3,737	3,742	3,747
PLUM GROVE	SAN JACINTO	LIBERTY	081054000	141	176	207	240	277	319
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	084343000	14	16	18	20	23	26
STEAM ELECTRIC POWER	TRINITY	LIBERTY	081002146	2,962	4,240	4,957	5,831	6,896	8,195
WEST HARDIN WSC	NECHES	LIBERTY	084383000	29	35	42	47	54	63

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
COUNTY-OTHER	BRAZOS	MADISON	080757157	106	110	113	115	118	122
COUNTY-OTHER	TRINITY	MADISON	080757157	896	931	959	971	998	1,032
IRRIGATION	TRINITY	MADISON	081004157	19	19	19	19	19	19
LIVESTOCK	BRAZOS	MADISON	081005157	120	120	120	120	120	120
LIVESTOCK	TRINITY	MADISON	081005157	630	630	630	630	630	630
MADISONVILLE	TRINITY	MADISON	080382000	781	815	837	856	881	908
MANUFACTURING	TRINITY	MADISON	081001157	260	289	316	343	367	398
MINING	BRAZOS	MADISON	081003157	9	9	9	9	9	9
MINING	TRINITY	MADISON	081003157	15	15	15	15	15	15
NORMANGEE	TRINITY	MADISON	080927000	10	11	12	12	13	13
CONROE	SAN JACINTO	MONTGOMERY	080130000	11,262	14,588	18,512	22,987	28,860	35,846
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	084072000	222	243	305	371	470	583
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	080757170	22,913	27,163	38,401	51,881	71,391	94,064
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	084081000	606	704	933	1,208	1,586	2,026
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	080854000	210	235	285	348	430	529
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	084098000	471	551	734	952	1,244	1,584
H M W SUD	SAN JACINTO	MONTGOMERY	084147000	1,696	1,864	2,282	2,768	3,434	4,208
HOUSTON	SAN JACINTO	MONTGOMERY	080285000	190	253	375	516	704	926
IRRIGATION	SAN JACINTO	MONTGOMERY	081004170	66	66	66	66	66	66
LIVESTOCK	SAN JACINTO	MONTGOMERY	081005170	510	510	510	510	510	510
MAGNOLIA	SAN JACINTO	MONTGOMERY	080907000	439	604	800	1,015	1,302	1,643
MANUFACTURING	SAN JACINTO	MONTGOMERY	081001170	2,045	2,332	2,608	2,883	3,126	3,392
MINING	SAN JACINTO	MONTGOMERY	081003170	480	509	526	543	559	573
MONTGOMERY	SAN JACINTO	MONTGOMERY		249	1,019	1,497	1,970	2,442	2,927
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	084261000	1,871	2,377	3,518	4,869	6,653	8,726
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	084262000	459	452	448	444	444	444
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	084263000	842	1,095	1,325	1,397	1,381	1,369
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	084264000	796	1,074	1,369	1,504	1,526	1,541
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	084265000	559	552	545	538	538	538
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	084266000	485	504	560	629	728	849
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	084267000	981	970	958	947	947	947
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	084268000	499	519	577	651	756	885
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	084272000	1,460	1,647	2,156	2,708	3,507	4,436
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	080726000	683	748	897	1,067	1,297	1,573
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	080732000	654	682	710	743	776	811

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	080734000	87	88	101	115	136	165
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	084305000	734	908	1,303	1,762	2,377	3,092
PORTER WSC	SAN JACINTO	MONTGOMERY	084307000	1,944	2,156	2,697	3,347	3,317	3,317
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	084312000	2,309	2,288	2,268	2,268	2,268	2,268
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	084322000	835	824	812	801	798	798
ROMAN FOREST	SAN JACINTO	MONTGOMERY	080801000	544	839	1,192	1,568	2,073	2,677
SHENANDOAH	SAN JACINTO	MONTGOMERY	080745000	1,746	2,024	2,358	2,721	3,205	3,792
SOUTHERN MONTGOMERY COUNTY MUD	SAN JACINTO	MONTGOMERY	084339000	1,901	2,402	2,417	2,493	2,523	2,581
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	084343000	254	281	352	432	542	675
SPLENDORA	SAN JACINTO	MONTGOMERY	080962000	188	224	297	383	502	640
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	084344000	537	612	800	1,025	1,335	1,696
STAGECOACH	SAN JACINTO	MONTGOMERY		79	106	144	194	265	365
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	084347000	744	904	898	892	892	892
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	081002170	5,046	8,537	9,981	11,741	13,886	16,502
THE WOODLANDS	SAN JACINTO	MONTGOMERY	088001000	14,671	26,596	28,330	28,197	28,063	28,063
WILLIS	SAN JACINTO	MONTGOMERY	080655000	568	649	816	1,024	1,296	1,626
WOODBRANCH	SAN JACINTO	MONTGOMERY	080807000	183	202	225	249	284	330
COUNTY-OTHER	TRINITY	POLK	080757187	1,600	1,691	1,744	1,794	1,880	1,976
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	POLK	084226000	890	944	985	1,004	1,044	1,100
LIVESTOCK	TRINITY	POLK	081005187	134	134	134	134	134	134
LIVINGSTON	TRINITY	POLK	080362000	2,137	2,517	2,802	3,006	3,212	3,423
MINING	TRINITY	POLK	081003187	29	31	32	33	34	35
ONALASKA	TRINITY	POLK	080933000	189	229	260	281	302	325
ONALASKA WSC	TRINITY	POLK	080727000	240	244	247	242	246	255
TRINITY RURAL WSC	TRINITY	POLK	084355000	6	7	8	8	9	9
COLDSPRING	SAN JACINTO	SAN JACINTO	080122000	44	51	56	59	60	61
COLDSPRING	TRINITY	SAN JACINTO	080122000	163	186	205	216	222	225
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	080757204	868	974	1,052	1,091	1,114	1,129
COUNTY-OTHER	TRINITY	SAN JACINTO	080757204	1,339	1,513	1,607	1,463	1,372	1,240
IRRIGATION	TRINITY	SAN JACINTO	081004204	667	667	667	667	667	667
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	SAN JACINTO	SAN JACINTO	084226000	95	114	127	133	137	140
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	SAN JACINTO	084226000	206	245	275	288	295	301
LIVESTOCK	SAN JACINTO	SAN JACINTO	081005204	142	142	142	142	142	142
LIVESTOCK	TRINITY	SAN JACINTO	081005204	142	142	142	142	142	142

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
MANUFACTURING	SAN JACINTO	SAN JACINTO	081001204	48	52	56	60	63	68
MERCY WSC	SAN JACINTO	SAN JACINTO	084253000	338	404	455	487	504	513
MINING	SAN JACINTO	SAN JACINTO	081003204	23	23	22	21	20	20
MINING	TRINITY	SAN JACINTO	081003204	7	6	6	6	6	6
POINT BLANK	TRINITY	SAN JACINTO	081056000	85	96	104	108	111	112
RIVERSIDE WSC	TRINITY	SAN JACINTO	084323000	150	179	213	270	302	337
SAN JACINTO WSC	TRINITY	SAN JACINTO	084328000	406	474	528	561	577	587
SHEPHERD	TRINITY	SAN JACINTO	080746000	301	355	394	411	424	431
COUNTY-OTHER	TRINITY	TRINITY	080757228	526	558	561	547	522	502
GROVETON	TRINITY	TRINITY	080255000	119	126	127	123	118	113
IRRIGATION	TRINITY	TRINITY	081004228	467	467	467	467	467	467
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	TRINITY	084226000	109	111	110	104	98	95
LIVESTOCK	TRINITY	TRINITY	081005228	211	211	211	211	211	211
MINING	TRINITY	TRINITY	081003228	6	6	6	6	6	6
TRINITY	TRINITY	TRINITY	080610000	170	172	165	152	142	137
TRINITY RURAL WSC	TRINITY	TRINITY	084355000	279	293	292	280	265	255
CONSOLIDATED WSC	TRINITY	WALKER	084071000	8	9	9	8	8	8
COUNTY-OTHER	SAN JACINTO	WALKER	080757236	4,509	2,629	2,899	2,601	2,659	2,659
COUNTY-OTHER	TRINITY	WALKER	080757236	3,278	3,252	3,420	2,888	2,671	2,374
HUNTSVILLE	SAN JACINTO	WALKER	080292000	6,287	7,529	7,659	7,512	7,469	7,472
HUNTSVILLE	TRINITY	WALKER	080292000	1,400	1,676	1,706	1,673	1,663	1,664
IRRIGATION	SAN JACINTO	WALKER	081004236	5	5	5	5	5	5
IRRIGATION	TRINITY	WALKER	081004236	6	6	6	6	6	6
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	WALKER	084226000	29	30	30	29	28	28
LIVESTOCK	SAN JACINTO	WALKER	081005236	310	310	310	310	310	310
LIVESTOCK	TRINITY	WALKER	081005236	322	322	322	322	322	322
MANUFACTURING	SAN JACINTO	WALKER	081001236	577	669	753	839	914	993
MANUFACTURING	TRINITY	WALKER	081001236	2,631	3,049	3,435	3,827	4,169	4,524
MINING	SAN JACINTO	WALKER	081003236	7	7	7	7	7	7
MINING	TRINITY	WALKER	081003236	6	6	6	6	6	6
NEW WAVERLY	SAN JACINTO	WALKER	080926000	218	235	243	236	235	235
RIVERSIDE WSC	TRINITY	WALKER	084323000	330	325	335	379	402	439
TRINITY RURAL WSC	TRINITY	WALKER	084355000	22	24	24	23	23	23
WALKER COUNTY RURAL WSC	TRINITY	WALKER	084372000	839	898	919	891	884	884
BROOKSHIRE	BRAZOS	WALLER	080077000	673	847	1,039	1,254	1,517	1,832
COUNTY-OTHER	BRAZOS	WALLER	080757237	685	708	755	794	869	954

WUG Name	WUG Basin	WUG County	WUG ID	Water Demand (acre-feet/year)					
				2010	2020	2030	2040	2050	2060
COUNTY-OTHER	SAN JACINTO	WALLER	080757237	841	1,013	1,227	1,435	1,729	2,066
HEMPSTEAD	BRAZOS	WALLER	080271000	1,457	2,052	2,694	3,427	4,294	5,313
IRRIGATION	BRAZOS	WALLER	081004237	4,825	4,825	4,825	4,825	4,825	4,825
IRRIGATION	SAN JACINTO	WALLER	081004237	18,153	18,153	18,153	18,153	18,153	18,153
KATY	SAN JACINTO	WALLER	080312000	271	405	554	722	919	1,151
LIVESTOCK	BRAZOS	WALLER	081005237	676	676	676	676	676	676
LIVESTOCK	SAN JACINTO	WALLER	081005237	263	263	263	263	263	263
MANUFACTURING	BRAZOS	WALLER	081001237	17	19	21	24	25	28
MANUFACTURING	SAN JACINTO	WALLER	081001237	72	82	91	99	108	116
MINING	BRAZOS	WALLER	081003237	9	9	9	9	9	9
MINING	SAN JACINTO	WALLER	081003237	71	71	71	71	71	71
PINE ISLAND	BRAZOS	WALLER	080938000	117	146	177	210	254	305
PRAIRIE VIEW	BRAZOS	WALLER	080485000	1,129	1,211	1,307	1,418	1,558	1,726
PRAIRIE VIEW	SAN JACINTO	WALLER	080485000	124	133	144	156	171	190
WALLER	SAN JACINTO	WALLER	080629000	416	488	572	668	782	917

Table 2-6
Year 2010 Water Demand by Wholesale Water Provider of All Water Use Categories

Wholesale Water Provider	Total Amount (acre-feet)
BAYTOWN AREA WATER AUTHORITY	17,535
BRAZOS RIVER AUTHORITY	155,030
BRAZOSPORT WATER AUTHORITY	8,743
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	2,375
CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	44,778
CITY OF GALVESTON	16,790
CITY OF HOUSTON	586,014
CITY OF HUNTSVILLE	22,403
CITY OF PASADENA	31,942
CITIES O RICHMOND AND ROSENBERG	
CITY OF SUGAR LAND	
CLEAR LAKE AREA WATER AUTHORITY	26,876
DOW CHEMICAL CO.	
FORT BEND COUNTY WCID 1	1,000
FORT BEND COUNTY WCID 2	8,155
GALVESTON COUNTY WCID 1	2,241
GULF COAST WATER AUTHORITY	235,400
LA PORTE AREA WATER AUTHORITY	9,750
LOWER NECHES VALLEY AUTHORITY	60,727
MISSOURI CITY	
NORTH CHANNEL WATER AUTHORITY	6,682
NORTH FORT BEND WATER AUTHORITY	21,841
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	34,714
NRG	20,500
SAN JACINTO RIVER AUTHORITY	91,296
TRINITY RIVER AUTHORITY	89,208
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	20,437

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category
Austin County*

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	3,918	4,258	4,494	4,590	4,639	4,756
2011	4,123	4,658	5,027	5,191	5,278	5,446
Difference	-205	-400	-533	-601	-639	-690
% Change	-5%	-9%	-12%	-13%	-14%	-15%
Livestock						
2006	1,615	1,615	1,615	1,615	1,615	1,615
2011	1,615	1,615	1,615	1,615	1,615	1,615
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Irrigation						
2006	10,617	10,617	10,617	10,617	10,617	10,617
2011	10,617	10,617	10,617	10,617	10,617	10,617
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Manufacturing						
2006	210	233	253	272	288	313
2011	210	233	253	272	288	313
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Mining						
2006	51	56	59	62	65	67
2011	51	56	59	62	65	67
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Brazoria County* (Continued)

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	44,685	50,822	56,754	62,022	68,202	74,967
2011	47,184	53,523	59,656	65,134	71,567	78,598
Difference	2,499	2,701	2,902	3,112	3,365	3,631
% Change	5.6%	5.3%	5.1%	5.0%	4.9%	4.8%
Livestock						
2006	1,614	1,614	1,614	1,614	1,614	1,614
2011	1,614	1,614	1,614	1,614	1,614	1,614
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	135,033	123,115	118,544	115,788	115,788	115,788
2011	135,033	123,115	118,544	115,788	115,788	115,788
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	260,239	286,554	309,841	333,348	354,093	379,241
2011	260,239	286,554	309,841	333,348	354,093	379,241
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	4,104	4,502	4,737	4,969	5,201	5,419
2011	4,104	4,502	4,737	4,969	5,201	5,419
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Chambers County*(continued)

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	4,625	5,438	6,180	6,824	7,506	8,249
2011	4,985	5,854	6,648	7,338	8,067	8,863
Difference	360	416	468	514	561	614
% Change	-7.8%	-7.6%	-7.6%	-7.5%	-7.5%	-7.4%
Livestock						
2006	462	462	462	462	462	462
2011	462	462	462	462	462	462
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	117,777	117,777	117,777	117,777	117,777	117,777
2011	117,777	117,777	117,777	117,777	117,777	117,777
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	11,802	12,959	13,987	15,011	15,932	17,122
2011	11,802	12,959	13,987	15,011	15,932	17,122
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	37,422	40,532	42,427	44,286	46,130	47,742
2011	37,422	40,532	42,427	44,286	46,130	47,742
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	4,435	3,536	4,134	4,863	5,751	6,834
2011	4,435	3,536	4,134	4,863	5,751	6,834
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Fort Bend County*(continued)

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	89,579	111,680	138,770	165,904	202,470	245,404
2011	109,869	143,023	174,552	208,691	251,533	300,689
Difference	20,290	31,343	35,782	42,787	49,063	55,285
% Change	22.7%	28.1%	25.8%	25.8%	24.2%	22.5%
Livestock						
2006	1,171	1,171	1,171	1,171	1,171	1,171
2011	1,171	1,171	1,171	1,171	1,171	1,171
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	53,455	53,455	53,455	53,455	53,455	53,455
2011	53,455	53,455	53,455	53,455	53,455	53,455
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	6,863	7,199	7,468	7,685	7,829	7,410
2011	6,863	7,199	7,468	7,685	7,829	7,410
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	3,010	3,070	3,105	3,138	3,169	3,196
2011	3,010	3,070	3,105	3,138	3,169	3,196
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	66,026	68,046	79,553	93,582	110,682	131,527
2011	66,026	68,046	79,553	93,582	110,682	131,527
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Galveston County (continued)*

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	46,090	47,390	47,818	47,487	47,393	47,641
2011	46,090	47,390	47,818	47,487	47,393	47,641
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Livestock						
2006	325	325	325	325	325	325
2011	325	325	325	325	325	325
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	10,342	10,342	10,342	10,342	10,342	10,342
2011	10,342	10,342	10,342	10,342	10,342	10,342
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	41,005	44,330	47,046	49,692	51,967	55,491
2011	41,005	44,330	47,046	49,692	51,967	55,491
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	265	279	286	293	300	307
2011	265	279	286	293	300	307
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	5,034	4,013	4,692	5,519	6,528	7,757
2011	5,034	4,013	4,692	5,519	6,528	7,757
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Harris County*(continued)

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	677,684	756,765	834,747	915,339	999,189	1,089,188
2011	709,300	789,397	868,320	948,412	1,030,899	1,119,593
Difference	31,616	32,632	33,573	33,073	31,710	30,405
% Change	4.7%	4.3%	4.0%	3.6%	3.2%	2.8%
Livestock						
2006	1,133	1,133	1,133	1,133	1,133	1,133
2011	1,133	1,133	1,133	1,133	1,133	1,133
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	15,300	15,300	15,300	15,300	15,300	15,300
2011	15,300	15,300	15,300	15,300	15,300	15,300
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	395,997	424,761	449,218	470,881	487,094	478,957
2011	395,997	424,761	449,218	470,881	487,094	478,957
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	1,282	1,434	1,529	1,624	1,720	1,805
2011	1,282	1,434	1,529	1,624	1,720	1,805
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	7,728	23,962	28,015	32,955	38,977	46,317
2011	7,728	23,962	28,015	32,955	38,977	46,317
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Leon County*(continued)

RWP	***Planning Decade***					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	2,122	2,364	2,475	2,441	2,400	2,422
2011	2,128	2,376	2,489	2,456	2,414	2,437
Difference	6	12	14	15	14	15
% Change	0%	1%	1%	1%	1%	1%
Livestock						
2006	1,691	1,691	1,691	1,691	1,691	1,691
2011	1,691	1,691	1,691	1,691	1,691	1,691
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	542	542	542	542	542	542
2011	542	542	542	542	542	542
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	714	842	967	1,093	1,207	1,313
2011	714	842	967	1,093	1,207	1,313
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	1,517	1,464	1,435	1,409	1,384	1,364
2011	1,517	1,464	1,435	1,409	1,384	1,364
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Liberty County*(continued)

RWP	***Planning Decade***					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	10,283	11,370	12,401	13,455	14,670	16,176
2011	10,470	11,759	12,980	14,211	15,629	17,362
Difference	187	389	579	756	959	1,186
% Change	1.8%	3.4%	4.7%	5.6%	6.5%	7.3%
Livestock						
2006	757	757	757	757	757	757
2011	757	757	757	757	757	757
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	82,901	82,901	82,901	82,901	82,901	82,901
2011	82,901	82,901	82,901	82,901	82,901	82,901
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	393	465	537	611	678	736
2011	393	465	537	611	678	736
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	8,730	8,753	8,766	8,778	8,790	8,800
2011	8,730	8,753	8,766	8,778	8,790	8,800
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	2,962	4,240	4,957	5,831	6,896	8,195
2011	2,962	4,240	4,957	5,831	6,896	8,195
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Madison County*(continued)

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	1,792	1,864	1,918	1,952	2,007	2,072
2011	1,793	1,867	1,921	1,954	2,010	2,075
Difference	1	3	3	2	3	3
% Change	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%
Livestock						
2006	750	750	750	750	750	750
2011	750	750	750	750	750	750
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	19	19	19	19	19	19
2011	19	19	19	19	19	19
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	260	289	316	343	367	398
2011	260	289	316	343	367	398
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	24	24	24	24	24	24
2011	24	24	24	24	24	24
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Montgomery County*(continued)

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	68,638	90,346	111,441	133,994	164,466	200,243
2011	74,871	98,947	122,197	146,984	180,292	219,432
Difference	6,233	8,601	10,756	12,990	15,826	19,189
% Change	9.1%	9.5%	9.7%	9.7%	9.6%	9.6%
Livestock						
2006	510	510	510	510	510	510
2011	510	510	510	510	510	510
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	66	66	66	66	66	66
2011	66	66	66	66	66	66
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	2,045	2,332	2,608	2,883	3,126	3,392
2011	2,045	2,332	2,608	2,883	3,126	3,392
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	480	509	526	543	559	573
2011	480	509	526	543	559	573
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	5,046	8,537	9,981	11,741	13,886	16,502
2011	5,046	8,537	9,981	11,741	13,886	16,502
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Polk County*(continued)

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	4,859	5,230	5,486	5,662	5,913	6,205
2011	5,062	5,632	6,046	6,335	6,693	7,088
Difference	203	402	560	673	780	883
% Change	4.2%	7.7%	10.2%	11.9%	13.2%	14.2%
Livestock						
2006	134	134	134	134	134	134
2011	134	134	134	134	134	134
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	29	31	32	33	34	35
2011	29	31	32	33	34	35
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

San Jacinto County*(continued)

RWP	*Planning Decade*					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	3,161	3,622	3,972	4,158	4,262	4,329
2011	3,153	3,616	3,964	4,120	4,207	4,251
Difference	-8	-6	-8	-38	-55	-78
% Change	-0.3%	-0.2%	-0.2%	-0.9%	-1.3%	-1.8%
Livestock						
2006	284	284	284	284	284	284
2011	284	284	284	284	284	284
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	667	667	667	667	667	667
2011	667	667	667	667	667	667
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	48	52	56	60	63	68
2011	48	52	56	60	63	68
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	30	29	28	27	26	26
2011	30	29	28	27	26	26
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Trinity County*(continued)

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	1,203	1,260	1,255	1,206	1,145	1,102
2011	1,203	1,260	1,255	1,206	1,145	1,102
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Livestock						
2006	211	211	211	211	211	211
2011	211	211	211	211	211	211
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	467	467	467	467	467	467
2011	467	467	467	467	467	467
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	6	6	6	6	6	6
2011	6	6	6	6	6	6
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Walker County*(continued)

RWP	Planning Decade					
	2010	2020	2030	2040	2050	2060
Municipal						
2006	16,512	17,941	18,516	18,146	18,097	18,097
2011	16,920	16,607	17,244	16,240	16,042	15,786
Difference	408	-1,334	-1,272	-1,906	-2,055	-2,311
% Change	2.5%	-7.4%	-6.9%	-10.5%	-11.4%	-12.8%
Livestock						
2006	632	632	632	632	632	632
2011	632	632	632	632	632	632
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Irrigation						
2006	11	11	11	11	11	11
2011	11	11	11	11	11	11
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing						
2006	3,208	3,718	4,188	4,666	5,083	5,517
2011	3,208	3,718	4,188	4,666	5,083	5,517
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining						
2006	13	13	13	13	13	13
2011	13	13	13	13	13	13
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*All values are presented in acre-feet per year

Table 2-7
Comparison Between 2006 RWP and 2011 RWP
Water Demands*(in acre-feet per year) by WUG Category

Waller County*(continued)

RWP	***Planning Decade***					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Municipal						
2006	5,393	6,310	7,380	8,530	10,016	11,757
2011	5,713	7,003	8,469	10,084	12,093	14,454
Difference	320	693	1,089	1,554	2,077	2,697
% Change	-6%	-11%	-15%	-18%	-21%	-23%
Livestock						
2006	939	939	939	939	939	939
2011	939	939	939	939	939	939
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Irrigation						
2006	22,978	22,978	22,978	22,978	22,978	22,978
2011	22,978	22,978	22,978	22,978	22,978	22,978
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Manufacturing						
2006	89	101	112	123	133	144
2011	89	101	112	123	133	144
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Mining						
2006	80	80	80	80	80	80
2011	80	80	80	80	80	80
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%
Steam-Electric Power Generation						
2006	0	0	0	0	0	0
2011	0	0	0	0	0	0
Difference	0	0	0	0	0	0
% Change	0%	0%	0%	0%	0%	0%

*All values are presented in acre-feet per year

FIGURES

Figure 2-7
Comparison of County Population Projections

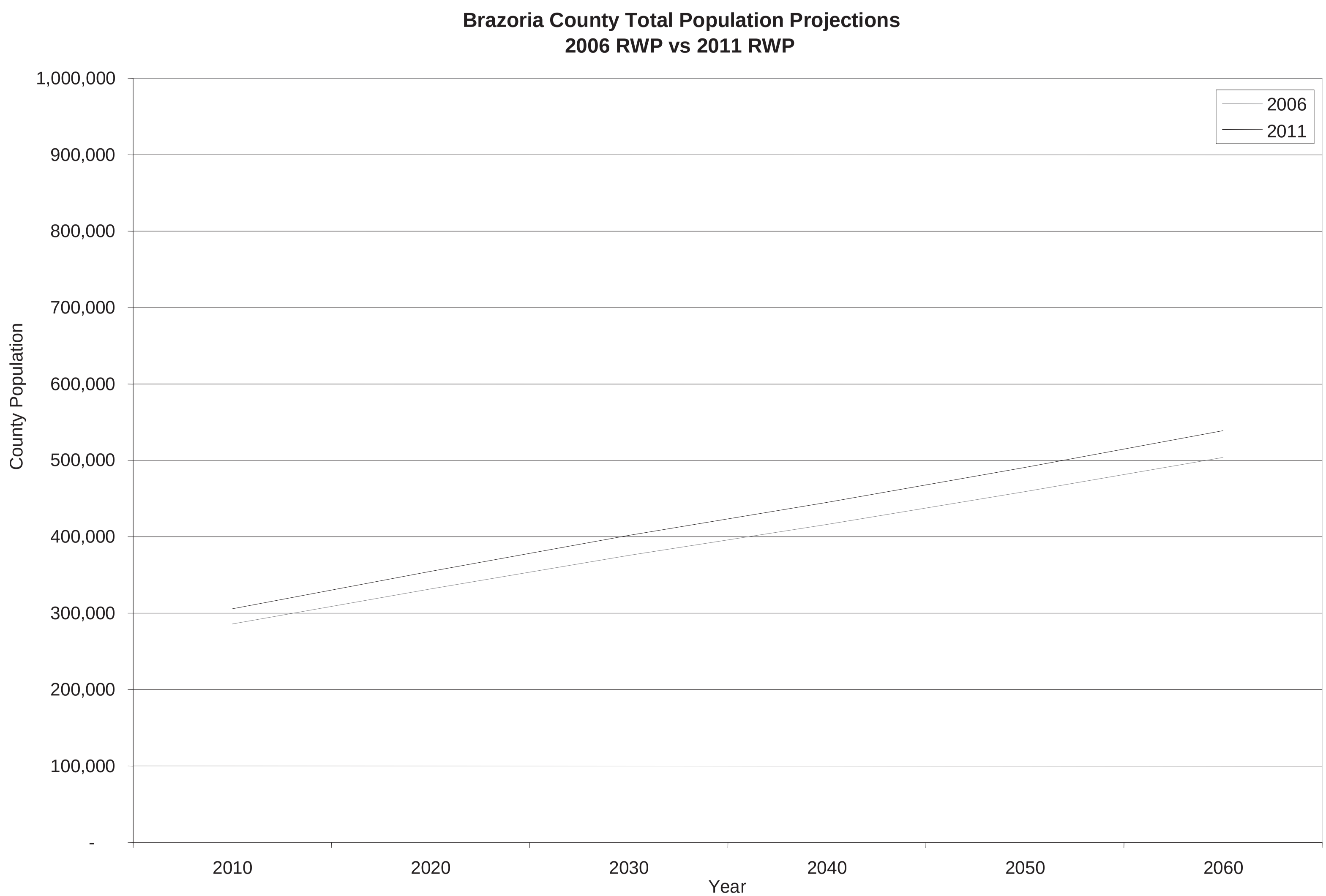


Figure 2-7 (Continued)
Comparison of County Population Projections

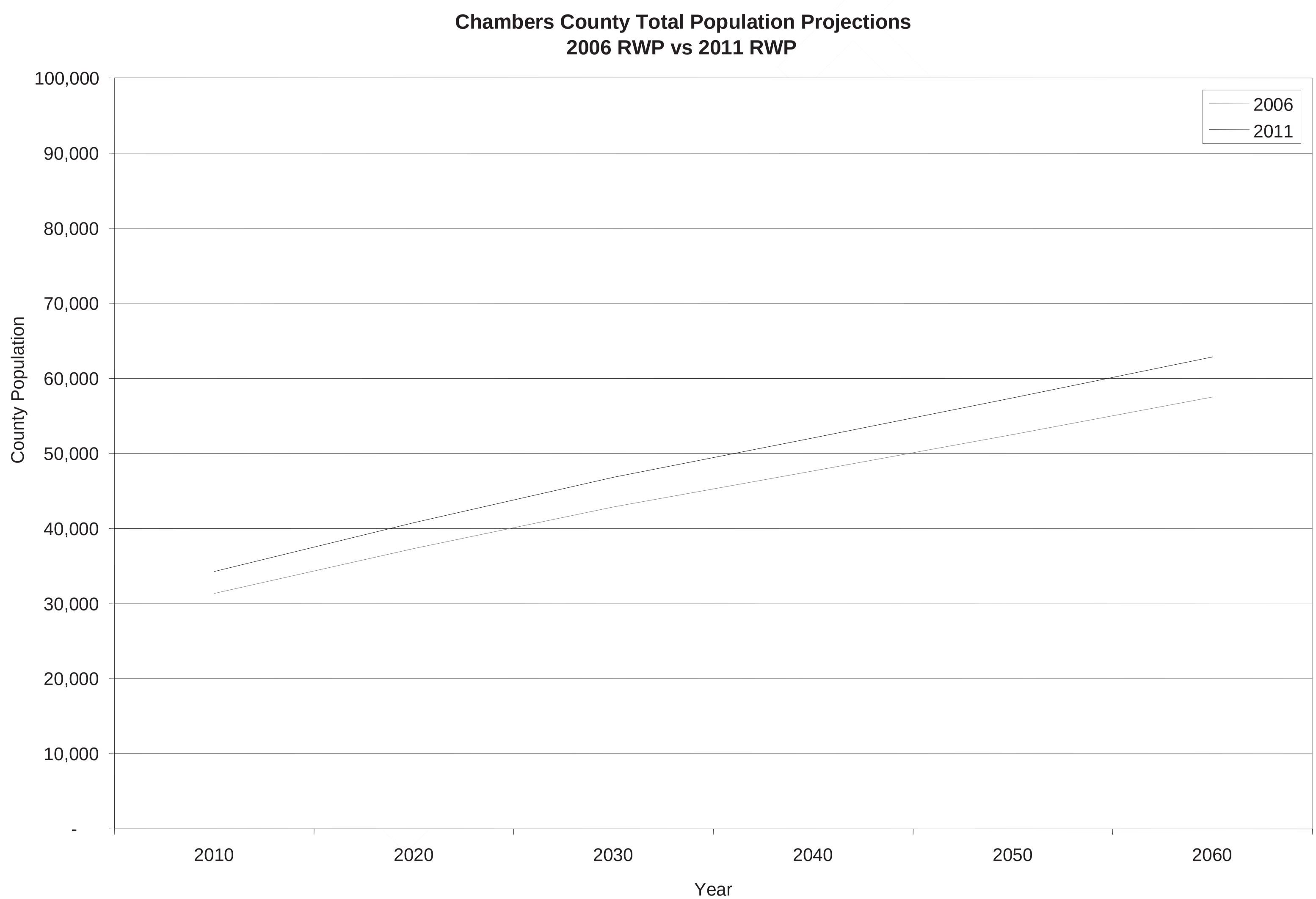


Figure 2-7 (Continued)
Comparison of County Population Projections

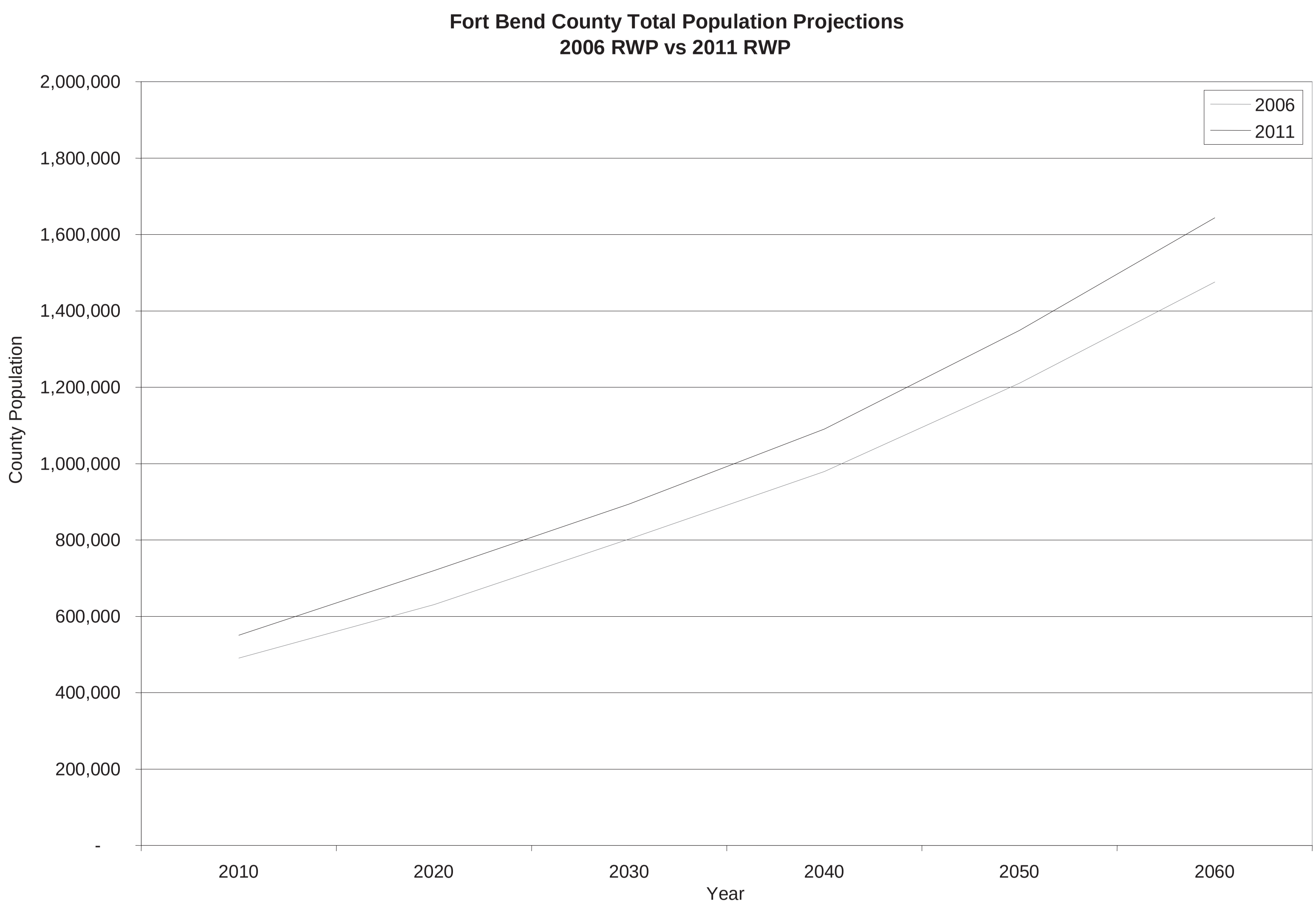


Figure 2-7 (Continued)
Comparison of County Population Projections

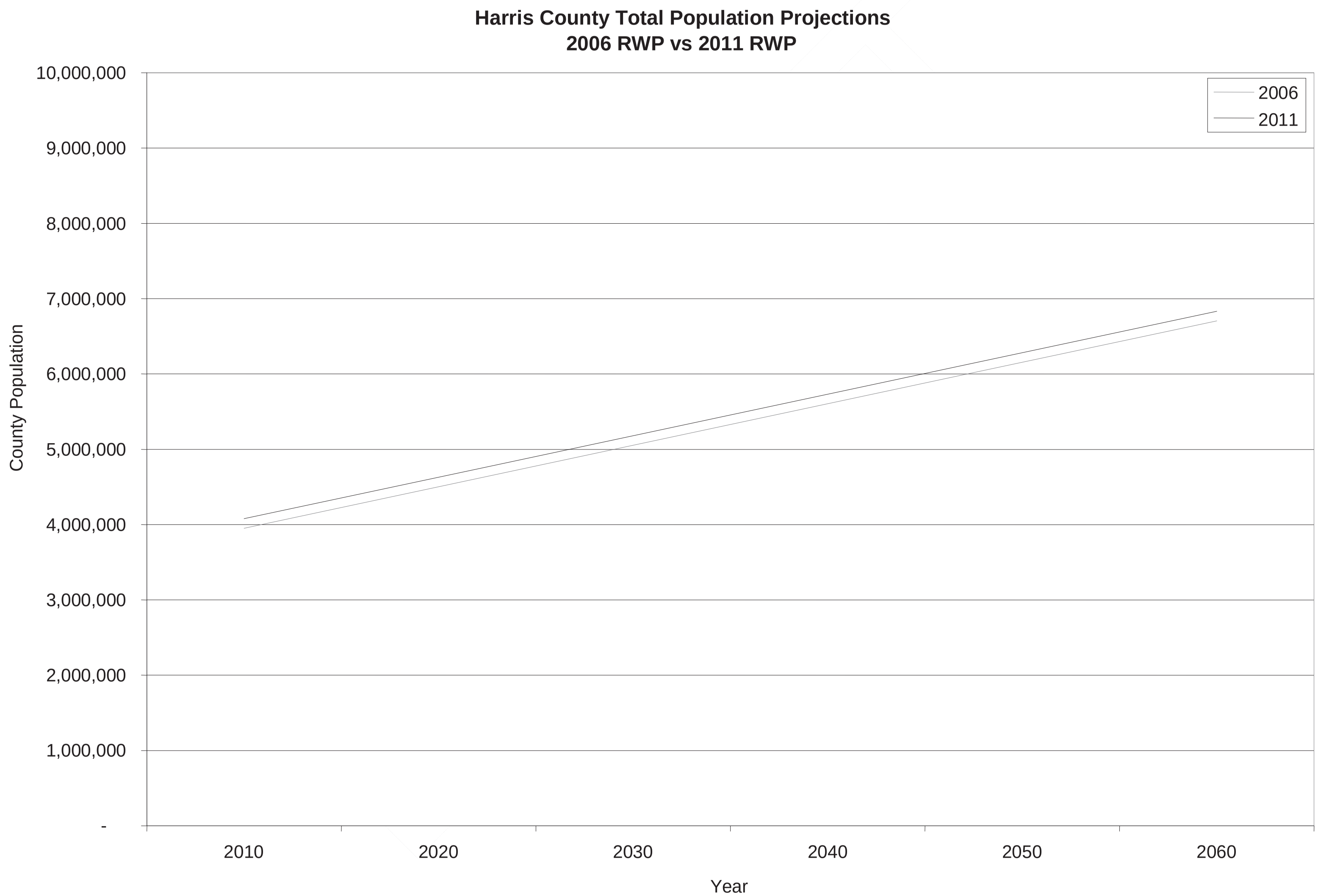
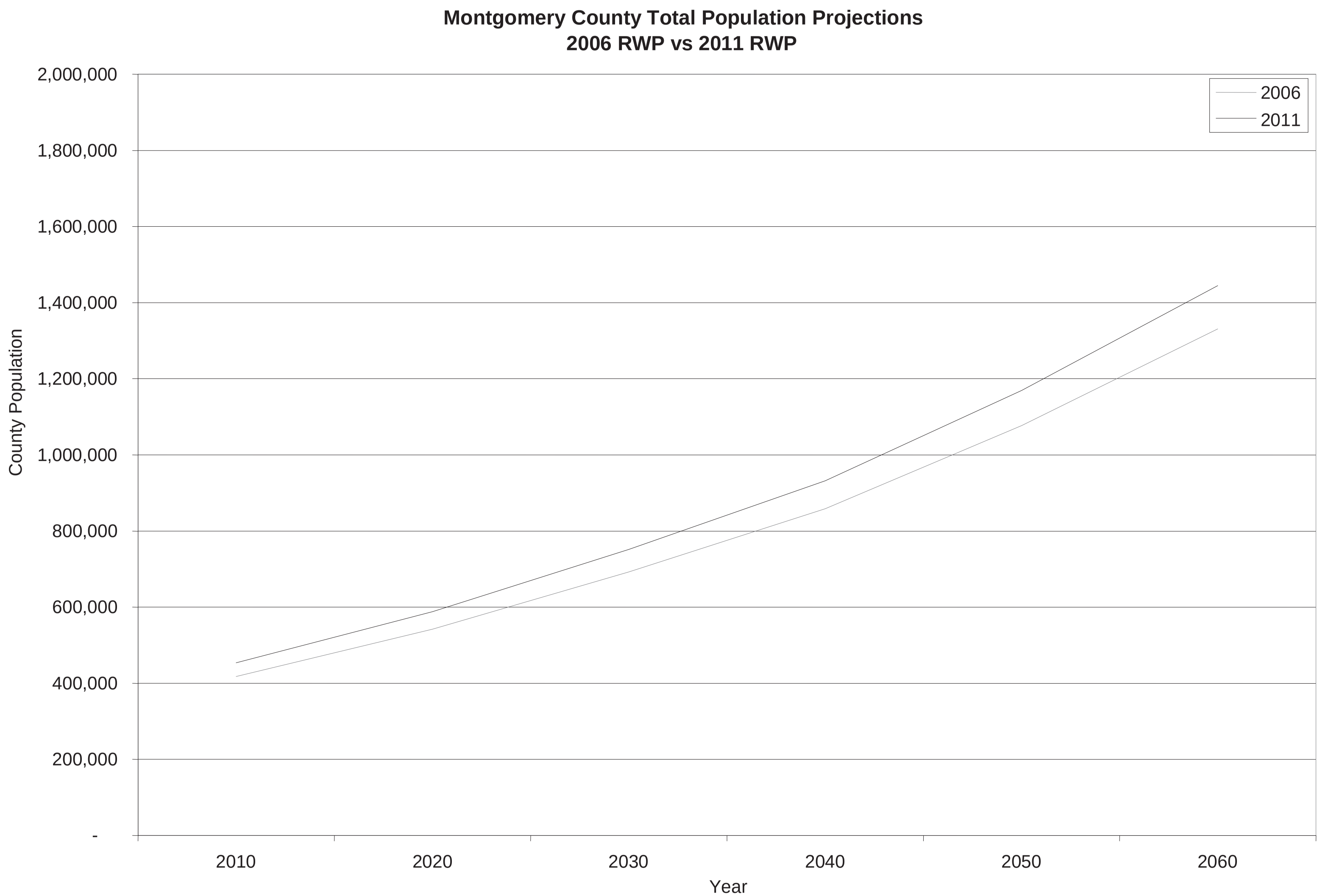


Figure 2-7 (Continued)
Comparison of County Population Projections



Appendix 2A

Sample WUG Survey Letter

This Page Intentionally
Left Blank

AECOM

AECOM
5757 Woodway Suite 101 West, Houston, TX 77057
T 713.780.4100 F 713.780.0838 www.aecom.com

April 1, 2009

City of Alvin
216 West Sealy
Alvin, TX 77511

Subject: Region H Water Planning Group Projected Population and Water Demand for 2011 Regional Water Plan

Dear Water User Group Representative:

We are writing this letter on behalf of the Region H Water Planning Group. AECOM is the lead consultant for the Region H Planning Group that is currently engaged in the process of preparing the 2011 Regional Water Plan (RWP) for the region. This plan is submitted to the Texas Water Development Board (TWDB) and will be used to compile the 2012 State Water Plan (SWP).

The consultant team is currently working on allocating water supplies and demands for Water User Groups (WUGs) in our region to determine projected future water shortages for each WUG. A WUG consists of a demand center to which water resources can be allocated. Municipal WUGs are associated with populations, and the projections of these populations are used to estimate future water demands.

The development of demand projections is a crucial first step for the planning process. These demands are compared to available water supplies to generate an overview of expected shortages for the future. Once these shortages are identified, strategies are assigned to meet future needs. The water management strategies from the RWP will eventually be written into the SWP. This is important to WUGs because proposed water projects must be consistent with the SWP to be eligible for State funding.

In the 2006 RWP, population and demand projections were provided by the TWDB and based on a cohort-component methodology incorporating Year 2000 Census data. Because no revised Census data is available in time for development of the 2011 RWP, the consultant team has prepared population projections based on a number of sources including information from the Texas State Data Center (SDC). When there was no evidence to indicate otherwise, WUGs were assigned the same population and demand projections used in the development of the 2006 RWP.

The Region H Planning Group has requested that information regarding revised projections for the 2011 RWP be provided to each WUG so that corrections may be made as necessary. The table below shows the current water demands (acre-ft/year) and projected populations for your WUG for the next 50 years:

2011 RWP Projections	2010	2020	2030	2040	2050	2060
WUG Projected Population:	23231	25123	26935	28605	30375	32223
WUG Projected Water Demand:	3123	3293	3440	3557	3743	3970

Please note that the above projected populations and water demands have been informally reviewed by the TWDB planning staff and have been deemed to be reasonable estimates of future needs.

We request a response to the projections shown above. We have established a secure website for your input and have provided a secure password to access the site and submit your response. Please login by clicking the link found at the web address given below and entering your unique login ID.

Website: www.regionHwater.org
Login ID: [redacted]

We are asking that you review the population and demand projections for your WUG and determine if either:

1. The numbers represent reasonable projections and require no revision, or
2. You would like to revise your projections *and can provide information to backup your request*, such as a planning level study of your water system.

Note that some WUGs are split by either county or river basin boundaries and there may be multiple entries related to your WUG. These detailed projections are available from the website.

Please also note that the TWDB has requirements for accepting revisions to the sub-county (i.e., cities, utilities or rural areas) population projections. Justifiable reasons for changes to these populations include:

- population estimates of the Texas State Data Center, or other credible sources, are greater than projected populations used in the 2007 state water plan for the year 2010;
- population growth rates for a sub-county area as tabulated by the Texas SDC over the most recent five years is substantially greater than growth rates reported by the U.S. Census Bureau between 1990 and 2000;
- cities have annexed additional land since the 2000 Census; or
- water utilities have expanded their service areas since last updated by the Texas Commission on Environmental Quality.

Municipal water demands may be adjusted for WUGs with revised population projections. Similarly, if acceptable data sources indicate that a measured gallons per capita per day from years prior to 2000 *is more representative of drought of record conditions*, the TWDB will consider formal requests for revisions.

You may also contact me directly regarding your request. In order to meet the accelerated timeline of this planning round, we would like to receive all responses (either by web or direct contact through me) by **April 15, 2009**. Information received by this date will be incorporated into projections that will be reviewed and considered for approval by the Region H Water Planning Group at their scheduled May 6, 2009 meeting. WUGs are highly encouraged to submit recommended changes (if needed) by April 15th to guarantee consideration for adoption at the May 6th meeting.

The consultant team is working with the WUGs in the region to ensure that the 2011 Regional Water Plan accurately reflects the current and future water supply plans for the WUGs in order to reduce the need for plan amendments and to ease the process for obtaining funding for vital infrastructure improvements. Therefore, your input in this matter is critical to our planning and we appreciate any assistance you may be able to provide.

If you have any questions regarding this matter or wish to discuss further, please feel free to call me at (713) 267-3112 or email me at Jason.Afinowicz@aecom.com.

Sincerely,

Jason D. Afinowicz, P.E.
Project Manager

JDA:mes

c: Project File

Appendix 2B

Resolution by the Region H Regional Water Planning Group Regarding Population Projections for the 2011 Regional Water Planning Cycle

This Page Intentionally
Left Blank

Resolution by the Region H Regional Water Planning Group Regarding Population Projections for the 2011 Regional Water Planning Cycle
Adopted November 4, 2009

WHEREAS, the Region H Regional Water Planning Group (Region H) is charged with developing and adopting, with broad public input, a regional water plan every five years; and

WHEREAS, Region H received guidance from the Texas Water Development Board (TWDB) in a letter dated December 3, 2008 that indicated with the exception of steam-electric water demands, the TWDB (also referred to as the Board) is not generating new 2011 plan projections for approval by the Board; and

WHEREAS, TWDB indicated that planning groups may request that the Board consider revisions to 2006 Regional Water Plan and 2007 State Water Plan population and water demand projections if conditions in a given planning area have changed sufficiently to warrant revisions. The TWDB further indicated:

- The January 2007 population estimates from the Texas State Data Center will be used as the primary standard to determine if changed conditions warrant any revisions to population projections, both at the local and regional level; and
- The Texas State Data Center estimates indicate that current population growth is exceeding projected growth rates for Region H as a whole. Increased regional totals, commensurate with growth which has occurred, are likely justified for this region, subject to TWDB approval; and

WHEREAS, Region H in conjunction with its consultant, AECOM, reviewed available data and information from various sources, including the Texas State Data Center, Houston-Galveston Area Council, U.S. Census Bureau, Region H's 2006 population and water demand projections, and input from various regional water planning group members; and

WHEREAS, Region H developed a set of recommended population and water demand projections for each county in Region H based on three methods; and

WHEREAS, TWDB selected Method 2 as the preferred method for altering the population projections for Brazoria, Chambers, Fort Bend, and Montgomery Counties and Method 1 for Harris County. A county-level comparison summary of differences between the Method 2 projections and the Method 3 projections for Fort Bend County is attached (Attachment 1); and

WHEREAS, at a regularly scheduled meeting on February 4, 2009 in Conroe, Region H reviewed these projections for counties and AECOM proceeded to develop population projections for Water User Groups (WUGs); and

WHEREAS, after developing initial population projections, AECOM mailed documentation to the Water User Groups (WUGs) soliciting their input on their population and water demand projections; and

WHEREAS, through correspondence with TWDB, the TWDB demographers indicated that the overall projections of State population and State growth rate was a prime motivator for the TWDB staff limiting the population projections for Fort Bend County; and

WHEREAS, at a regularly scheduled meeting on May 6, 2009 in Conroe, Region H adopted these projections, excluding the City of Richmond, the City of Huntsville, and steam electric demand projections for Fort Bend and Galveston County, as its initially prepared projections for Water User Groups (WUGs), TWDB and the public to review and comment on; and

WHEREAS, after considerable debate and discussion among the group at its regular meeting on July 1, 2009 in Conroe, Region H decided to use the TWDB recommended population projections for Fort Bend County. During this discussion, planning group members expressed their concern that to continue forward and challenge the TWDB's staff recommendation on population projections for Fort Bend County may not be successful, but most importantly would put at risk the ability to develop a regional plan within the deadlines established by the TWDB; and

WHEREAS, Region H conducted two public meetings on May 6, 2009 and July 1, 2009 to receive comments from the public and WUGs; and

WHEREAS, Region H planning group members drafted a resolution for its consideration at its September 2, 2009 meeting as a method to express and document its concerns regarding the use of the TWDB recommended population projections for Fort Bend County for the 2011 plan. The planning group has expressed concerns that the adopted TWDB recommended population projections for Fort Bend County do not reflect the actual growth that it is seeing in the planning region over the recent past and expects to experience in the near future; and

WHEREAS, Region H planning group has compiled a comparison of population projections for Fort Bend County (Attachment 2) that illustrates the estimates and actual population projections for Fort Bend County since 1990;

THEREFORE BE IT RESOLVED that:

(1) Region H desires to express its appreciation to the TWDB for recognizing that the region is seeing increased demands for water and has experienced significant population growth at a rate greater than expected in the approved 2006 Region H Plan. However, the planning group does not believe that the population projections developed with TWDB guidance described above and informally reviewed by the TWDB for the 2011 planning process for Region H captures all of the population growth that is being experienced in Fort Bend County and what is expected to be seen in the near future.

(2) Region H's data review has shown that Fort Bend County is currently experiencing growth beyond what is projected in the submitted projections for the 2011 planning process but is aware that higher levels of growth will not be permitted by TWDB.

(3) Given the tight plan development timeline requirements, Region H decided to move forward with adopting the population projections developed with TWDB guidance for Fort Bend County for the 2011 planning process in order to assure that Region H could develop and approve a regional plan that would meet the required TWDB planning process deadlines.

(4) Region H urges the TWDB to consider starting the 2016 planning cycle population and water demand projection development as early as possible in order to provide additional time to consider new information at that time, including 2010 census data.

Judge Mark Evans, CHAIRMAN DATE
Region H Regional Water Planning Group

ATTEST:

Secretary Date

Contents

List of Tables

List of Figures

List of Appendices

**This Page
Intentionally Left Blank**

Chapter 3 – Analysis of Current Water Supplies

3.1 Introduction

As presented in *Chapter 1*, groundwater resources in Region H consist of two major aquifers and four minor aquifers. The two major aquifers are the Gulf Coast aquifer and the Carrizo-Wilcox aquifer; four minor aquifers present are the Sparta, Queen City, Yegua-Jackson, and Brazos River alluvium aquifers.

Much of the regional water demand is supplied by surface water. Of the total year 2000 water demand over 70 percent, or 1,267,410 acre-feet, was supplied by surface water as found in the TWDB Year 2000 Water Use Survey. By 2004, surface water use reported to the TWDB increased to approximately 1,240,000 acre-feet, accounting for 70 percent of the total water used in Region H. Surface water supplies are obtained from the Lake Livingston-Wallisville Salt Water Barrier System on the Trinity River, Lake Conroe and Lake Houston on the San Jacinto River, the Brazos River Authority/U.S. Army Corps of Engineers (BRA/COE) System, ROR flows from the Trinity, Brazos, and San Jacinto Rivers, the corresponding coastal basins, and some smaller tributaries and reservoirs. Groundwater supplies the remaining 30 percent of the water.

This chapter summarizes the results of Task 3, and describes the resources available to the region and their allocation to Water User Groups (WUGs) throughout Region H. Also, to provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as TWDB DB12. Tables that contain this information are identified below and are located in the appendices accompanying this chapter.

- *Appendix 3A* – Current Water Supply Sources Available During Drought of Record Conditions
- *Appendix 3H* – Current Water Supplies Available to Region H by City and Category
- *Appendix 3I* – Current Water Supplies Available to Region H by Wholesale Water Provider

Some of the information contained within this chapter is based on information published in *Chapter 1 – Description of the Region*. For a complete and detailed list of sources, see *Appendix* 1A, references for *Chapter 1*.

3.2 Identification of Groundwater Sources[1]

3.2.1 Groundwater Aquifers

As presented in *Chapter 1*, groundwater resources in Region H consist of two major aquifers and four minor aquifers. The two major aquifers are the Gulf Coast aquifer and the Carrizo-Wilcox aquifer, with the Gulf Coast aquifer furnishing the majority of groundwater in the region south of and within Waller and Walker Counties. The four minor aquifers present are the Sparta, Queen City, Yegua-Jackson, and Brazos River alluvium.

[1] The information contained in this portion of *Chapter 3* was provided by LBG-Guyton Associates.

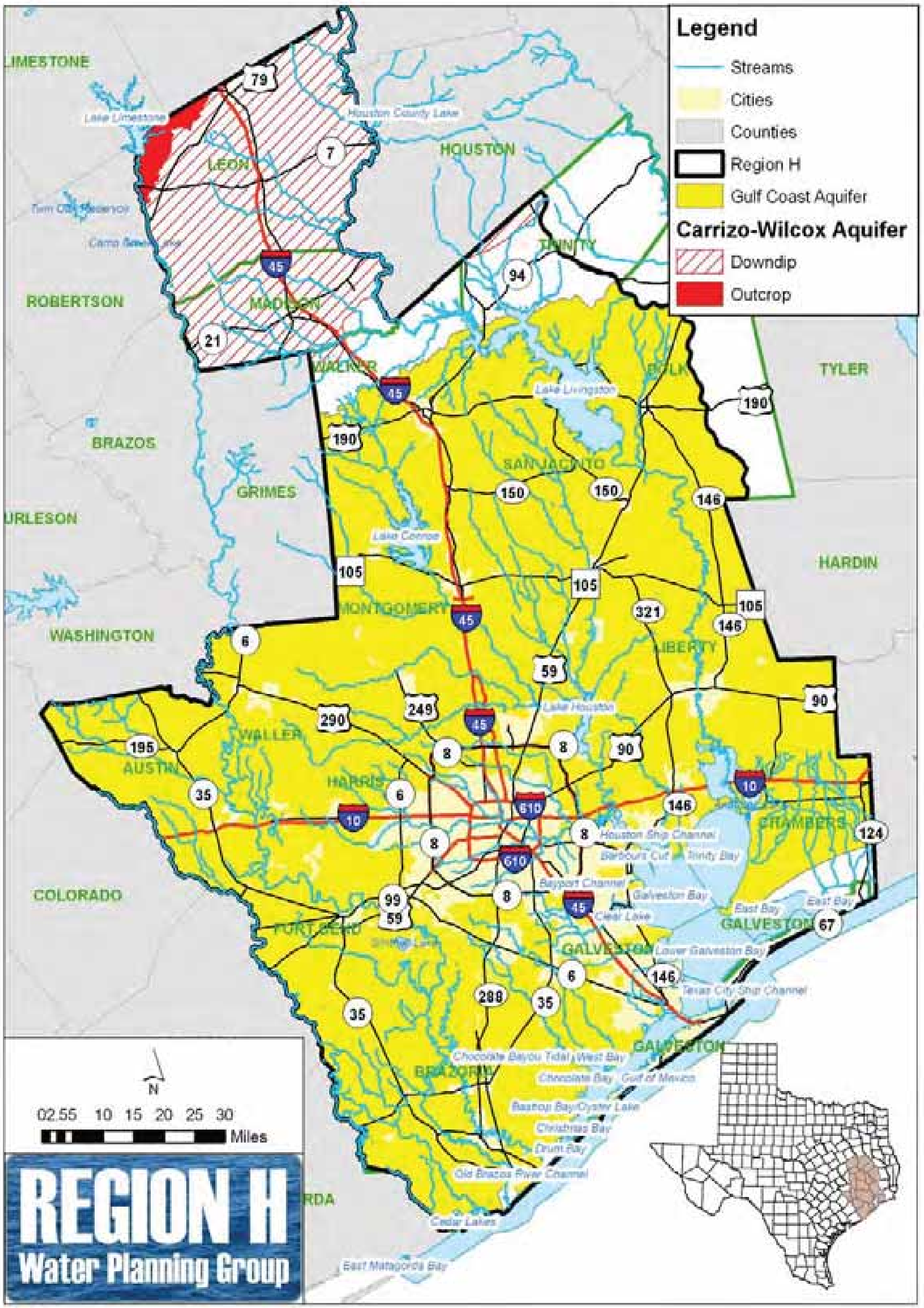
The Carrizo-Wilcox is the main aquifer in the northern part of Region H in Leon County and the northern portion of Madison County. The aquifer is composed of, in ascending order, the Wilcox Group and the Carrizo Formation. Because they are weakly connected hydraulically, they are generally described as one major aquifer. However, for groundwater flow modeling purposes in the Central Queen City Sparta Groundwater Availability Model developed by TWDB, the Wilcox aquifer is modeled as three separate layers and the Carrizo as one layer. The Wilcox Group is composed of alternating beds of sand, sandy clay, and clay with locally interbedded gravel, silt, clay, and lignite. The Carrizo Formation is a uniform, well sorted sand that contains a few very thin beds of clay; the aquifer dips downward to the southeast at about 70 to 100 feet per mile. The Carrizo-Wilcox aquifer supplies groundwater for domestic, municipal, manufacturing, and agricultural uses in Leon and Madison Counties. *Figure 3-1*, Major Groundwater Aquifers, provides a map showing the location of the aquifer.

A groundwater availability model (GAM) was developed for the Carrizo-Wilcox, Queen City and Sparta aquifers in the area of Leon and Madison Counties, and the model is described in a report prepared by the TWDB entitled *Groundwater Availability Models for the Queen City and Sparta Aquifers*, October 2004. The model divides the Carrizo-Wilcox aquifer into four layers, which are the Carrizo Sand or Carrizo Formation and the Calvert Bluff, Simsboro and Hooper Formations of the Wilcox Group. The model also has layers for the Queen City aquifer and the Sparta aquifer. The main layers of the model that provide substantial amounts of water are the Carrizo Sand and the Simsboro, with a smaller amount of water provided by the Sparta aquifer. Utilization of the model provides an additional method to evaluate the groundwater resources in the northern part of Region H.

The Gulf Coast aquifer consists of four general water-producing units. The geologically youngest unit is the Chicot aquifer, followed by the Evangeline aquifer, the Jasper aquifer, and the Catahoula Formation. The Chicot and Evangeline aquifers are the more prolific water-producing units in the Gulf Coast aquifer followed by the Jasper aquifer and the Catahoula Formation. The Gulf Coast aquifer extends from the Gulf Coast to approximately 100 to 120 miles inland in Walker and Trinity Counties. The units are composed of alternating beds of sand, silt, and clay; shale can occur at deeper depths at and below the base of the Evangeline aquifer. Formation beds vary in thickness and composition and the areal extent of individual beds normally cannot be traced over extended distances. Total aquifer sand thickness varies and can be as great as several hundred feet. The Gulf Coast aquifer supplies groundwater for domestic, municipal, manufacturing, and agricultural uses in Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Polk, San Jacinto, Trinity, Walker, and Waller Counties. The estimates of groundwater availability for Austin, Fort Bend, Galveston, Harris, Montgomery, Walker and Waller Counties are consistent with either groundwater management plans or groundwater management strategies developed by the groundwater conservation districts or subsidence districts that encompass the counties. The estimates of availability are the maximum amounts of groundwater that can be withdrawn in the future, based on the planning and rules and regulations of the districts. For Chambers, Liberty, Polk, San Jacinto and Trinity Counties that are not in groundwater conservation districts, the estimates of groundwater availability are the largest estimated amounts that can be pumped annually, based on previous regional water planning efforts including those performed by the TWDB.

Figure 3-1

Major Groundwater Aquifers



A groundwater flow model which includes the counties within Region H has been developed by the TWDB for the Gulf Coast aquifer and was released in February 2005. The model has four layers to represent the Gulf Coast aquifer (Layers 1, 2, 3, and 4), representing the Chicot aquifer, Evangeline aquifer, Burkeville confining unit, and Jasper aquifers, respectively. The model provides an additional tool for evaluating the groundwater resources within Region H.

The Queen City Formation is a minor aquifer that occurs in central and southeastern Leon County and in the northern part of Madison County. The Queen City Formation is composed of sand and loosely cemented sandstone with interbedded shale layers occurring throughout. The Queen City Formation ranges in thickness from 250 to 400 feet with approximately 60 to 70 percent of the total thickness being sand according to Texas Water Commission Bulletin 6513 (1965), “Availability and Quality of Ground Water in Leon County, Texas”. The aquifer is further described in the 2004 GAM model report developed by the TWDB. Groundwater in small to moderate quantities is provided by the Queen City Formation for domestic, municipal, industrial, and agricultural uses in Leon and Madison Counties.

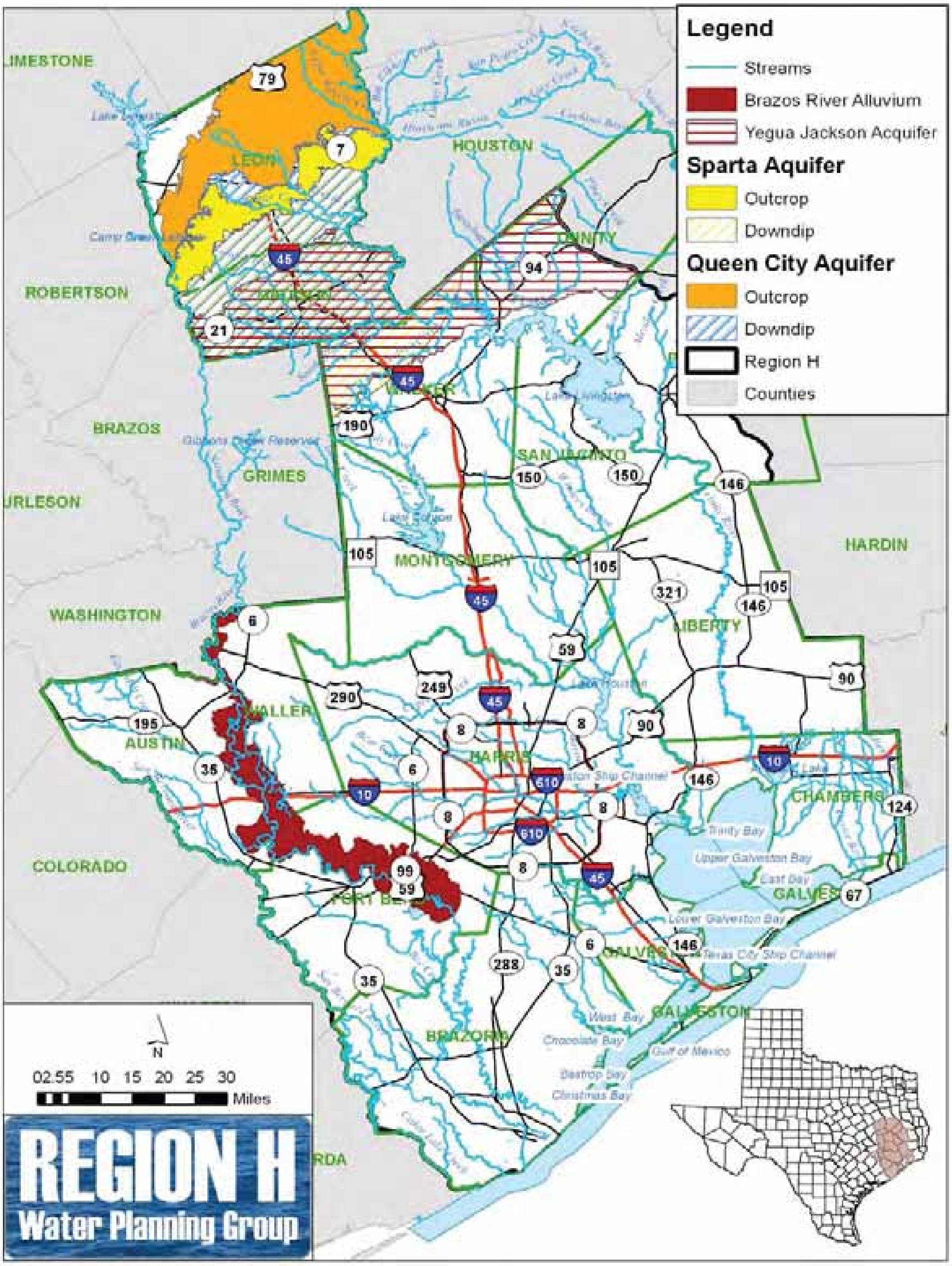
The Sparta Formation or Sparta Sand is another minor aquifer that occurs in southeastern Leon County, all of Madison County, northwestern Walker County and northeastern Trinity County. The Sparta Formation consists of sand and interbedded clay, with the lower portion of the aquifer containing massive unconsolidated sands with a few layers of shale. The Sparta Formation ranges in thickness from 150 to 300 feet in Leon County and Madison County (Texas Workforce Commission Bulletin 6513). Groundwater from the aquifer is provided for domestic, municipal, and agricultural uses in Leon County and for domestic, municipal, manufacturing, and agricultural uses in Madison County. The Sparta Formation is the groundwater source for the Town of Madisonville and for some water supply corporations in the area.

The Yegua Formation and Jackson Group make up a minor aquifer, designated as the Yegua-Jackson aquifer, which occurs within the region in parts of Madison, Walker, Trinity and Polk Counties. The Yegua Formation consists of sand, interbedded clay, and scattered lignite. The Jackson Group includes all strata between the Yegua Formation and the Catahoula Sandstone and consists of sand, clay, sandstone, and siltstone. The Yegua Formation ranges in thickness from 1,000 to 1,500 feet; the Jackson Group is approximately 1,100 feet thick, according to Texas Board of Water Engineers Bulletin 5003 (1950), “Geology and Ground-Water Resources of Walker County, Texas”. Small to moderate quantities of groundwater are provided by the Yegua-Jackson aquifer for domestic, municipal, industrial, and agricultural uses.

The Brazos River alluvium is the fourth minor aquifer in the region. The Brazos River alluvium occurs in the floodplain and terrace deposits of the Brazos River in Austin, Fort Bend and Waller Counties as shown on *Figure 3-2*, Minor Groundwater Aquifers. The Quaternary alluvial sediments consist of clay, silt, sand, and gravel according to TWDB Report 345 (1995), *Aquifers of Texas*, with the more permeable sand and gravel present in the lower part of the aquifer. The saturated thickness of the sediments is as much as 85 feet and the width of the alluvium ranges from less than 1 mile to approximately 7 miles, with the Brazos River located within the width of the alluvial deposits. The Brazos River alluvium supplies groundwater for domestic and agricultural purposes in Fort Bend and Waller Counties. In Austin County, it supplies groundwater for domestic, manufacturing, and agricultural uses.

Figure 3-2

Minor Groundwater Aquifers



Recharge to the two major and four minor aquifers is principally from the infiltration of precipitation and streamflow on the outcrops, as shown in *Figure 3-3*, Aquifer Outcrop Areas. A portion of the water infiltrates to the zone of saturation and then moves downdip through the aquifers, while large amounts of precipitation on the outcrops are rejected recharge, and become surface water runoff to ponds, lakes, creeks, streams and rivers. Average annual precipitation in Region H ranges from about 40 inches per year in the northern area to about 50 to 54 per year inches in the southeastern area.

3.2.2 Groundwater Use Overview

According to TWDB and Harris-Galveston Subsidence District (HGSD), Region H pumped approximately 643,175 acre-feet of groundwater in 2000. Groundwater in the region is used for domestic, municipal, manufacturing, steam-electric power cooling and agricultural purposes. The majority of the water is used for municipal purposes. Municipal usage accounts for approximately 78 percent or 501,626 acre-feet of the water pumped. Municipal pumpage consists of water used for cities and communities, parks, campgrounds and water districts serving principally residential developments. Agricultural usage accounts for approximately 14 percent or 90,084 acre-feet of the groundwater pumped. Major agricultural crops include rice, soybeans, corn, cotton and hay. Cattle are the principal livestock raised in the region. Finally, industrial usage represents approximately 8 percent or 51,454 acre-feet of the groundwater—water pumped for manufacturing, mining, steam-electric power, and other industrial needs. A majority of the overall groundwater usage is in the southern part of the region where more of the population, industrial, and agricultural demands exist and where the aquifer is capable of providing large quantities of water for the various uses. Providing pumping data for 2000 was chosen as it was a year with census data and it was a year with lower precipitation and somewhat higher pumping.

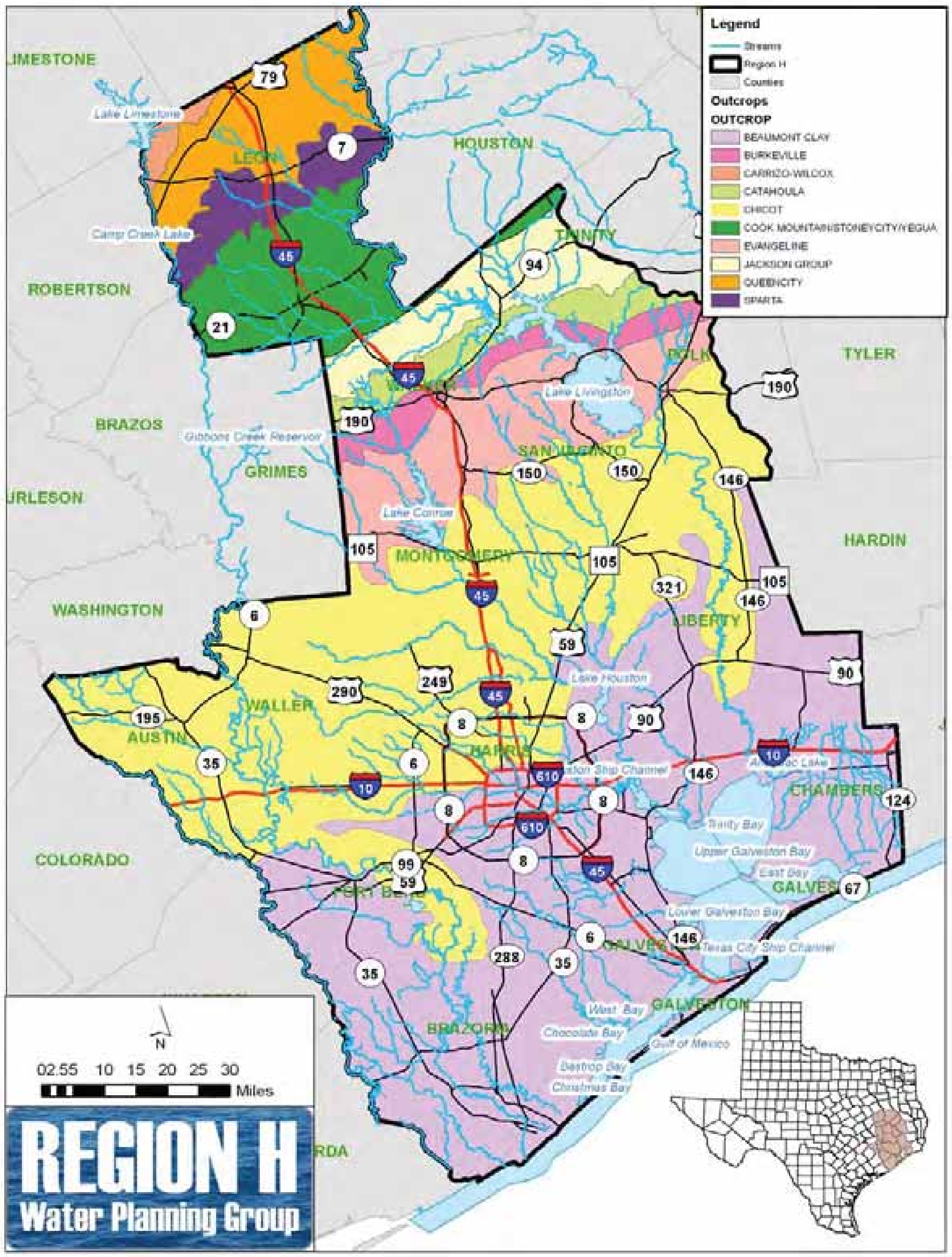
Groundwater pumping data for Region H in 2003, a year with higher overall average annual precipitation, was about 555,300 acre-feet. The year 2003 is the most recent year with groundwater pumping data available from TWDB.

3.2.3 Aquifer Conditions

Groundwater conditions within the region have been and should continue to be favorable for the pumping of substantial quantities of good quality water to help satisfy the multiple water needs of the region. The principal aquifers that will provide the water include the Carrizo-Wilcox in Leon and Madison Counties, the Sparta aquifer system in Madison, Walker and Trinity Counties, and the Gulf Coast aquifer system in the central and southern sections of the region. Smaller amounts of water can be provided by the Queen City, Sparta, Yegua-Jackson, and Brazos River alluvium aquifers, with the minor aquifers being particularly important in areas that do not require large quantities of water to reliably meet the demands.

Figure 3-3

Aquifer Outcrop Areas



3.2.3.1 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox aquifer was deposited in a manner that resulted in a sequence of geologic formations of interbedded sand, silt, clay and shale having a thickness of about 2,000 feet in the northern part of the region. The Carrizo Sand is one of two principal water-producing units of the Carrizo-Wilcox aquifer and it is about 100 to 200 feet thick. The Simsboro Sand is the major water-producing unit in the Wilcox and is about 200 to 400 feet thick. Currently, the overall availability of water from the Carrizo-Wilcox aquifer in Leon and Madison Counties is about 8,400 acre-feet per year based on the management plan adopted by the Mid-East Texas Groundwater Conservation District (METGCD) that includes Leon and Madison Counties. The estimate of groundwater availability for the two counties is under review by the METGCD and may be revised in the future. The current estimates of groundwater availability within the METGCD are consistent with the management plan adopted by the District. The METGCD is developing desired future conditions for the aquifers which will result in an estimate of managed available groundwater and those estimates may vary some from the current estimates of availability in Leon and Madison Counties. If that occurs, the revised estimates for groundwater availability in the two counties can be included in the next regional water planning effort. In 2000, about 4,030 acre-feet of groundwater was pumped from the aquifer in the two counties, based on data from TWDB. Conditions are favorable in the two counties to develop additional supplies from the Carrizo-Wilcox aquifer. The development should be done in a manner that will properly manage the aquifer and monitor its response to the stress of additional groundwater pumping. Water from the aquifer contains less than 1,000 milligrams per liter (mg/l) of total dissolved solids, but water from the Carrizo Sand can contain elevated levels of iron that require sequestering or treatment for removal for water used for most municipal and industrial purposes.

3.2.3.2 Gulf Coast Aquifer

The Gulf Coast aquifer was deposited in a manner that resulted in interbedded sand and clay layers with a substantial thickness of sand that contains water of good quality. The lower unit of the aquifer, the Catahoula Sandstone, is screened by wells for the City of Huntsville and other wells in Walker County. To the south, in Galveston County, the Chicot unit is screened in wells used by the City of Galveston. The aquifer is capable of yielding larger quantities of water in the central and southern parts of Region H and has been utilized over the past 100 years to provide part of the water supply. The Gulf Coast aquifer has sand thicknesses ranging from about 200 to 500 feet in the central and southern parts of the region with the sands containing freshwater decreasing in thickness as the aquifers approach within about 30 to 40 miles of the Gulf Coast.

The pumpage of large quantities of water in the southern part of the region has caused the aquifer’s potentiometric head to decline from 50 to about 350 feet in parts of Harris County. Land subsidence of significant magnitude has occurred in parts of Harris and Galveston Counties, resulting in the gradual reduction and shift in areal extent of groundwater pumping to the west over the past 25 years. Subsidence is discussed in the next section of this report.

Digital groundwater flow models have been developed over the past 25 years for the Chicot and Evangeline aquifers in the southern part of Region H to help assess the groundwater resources. As mentioned previously, the most recent digital model was developed by the U. S. Geological Survey for the TWDB with a 2004 report regarding the model titled “Hydrogeology and Simulation of Ground-Water Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas.”

3.2.3.3 Queen City and Sparta Aquifers

The Queen City and Sparta aquifers occur in the northern part of the region and are capable of providing some water in Leon, Madison and Trinity Counties, and the northern part of Walker County. Estimated overall availability from the aquifers is about 25,525 acre-feet per year based on groundwater supply data from TWDB. Water availability estimates from the Queen City and Sparta aquifers for the year 2000 are approximately 12,455, 10,790, 245, and 2,035 acre-feet per year in Leon, Madison, Trinity, and Walker Counties, respectively. The two aquifers are composed of sands that can provide small to moderate quantities of water to wells. The water-transmitting capabilities of the aquifers are limited but adequate for meeting smaller demands (pumping rates of 50 to 1,000 gallons per minute [gpm]). The aquifers contain water with less than 1,000 mg/l of total dissolved solids to depths that range from about 800 to 1,000 feet. Pumping from the two aquifers in Leon and Madison Counties in the year 2000 was about 3,500 acre-feet based on data from TWDB. No pumpage was recorded in the year 2000 TWDB data for either aquifer for Trinity and Walker Counties.

3.2.3.4 Yegua-Jackson Aquifer

The Yegua-Jackson aquifer is located in the northern part of the region and is capable of providing some water in Madison, Polk, Trinity, and Walker Counties. However, estimated usage specifically for the Yegua-Jackson aquifer has not yet been determined by TWDB for these counties. Each of these counties has data available for other-undifferentiated aquifers. According to the TWDB data, the total amount used in these four counties in this category was approximately 3,100 acre-feet in 2000.

The aquifer is composed of sands that can provide small to moderate quantities of water to wells. According to TWDB estimates in the 2002 Texas State Water Plan, yields of most wells completed in the Yegua-Jackson aquifer are small (less than 50 gpm) and net fresh water sands are generally less than 200 feet thick at any location within the aquifer. The quality of the water in the aquifer ranges from good to slightly saline. The 2002 plan also estimates that the entire Yegua-Jackson aquifer in the state produced about 11,000 acre-feet of water in 1997.

3.2.3.5 Brazos River Alluvium

The Brazos River alluvium is a shallow aquifer that is about one to seven miles wide in a corridor along the Brazos River in Waller, Austin, and Fort Bend Counties. The aquifer typically does not extend to a depth greater than 100 feet deep with wells mostly constructed to provide water for irrigation of row crops and hay. The aquifer may contain water with total dissolved solids that approach 1,000 mg/l and have a high total hardness due to the amounts of calcium, magnesium, and sulfate in the aquifer water. Based on estimates from TWDB, the overall availability of water from the Brazos River alluvium in Austin, Waller, and Fort Bend Counties is about 41,500 acre-feet per year with 2000 pumpage in Fort Bend County estimated at 8,737 acre-feet per year by TWDB. No pumpage was recorded in the 2000 TWDB data for either Austin or Waller Counties. The aquifer should continue to be able to provide water for various uses.

3.2.4 Subsidence Effects

Subsidence has occurred principally in Harris, Galveston, Brazoria, Fort Bend, and Chambers Counties, as the result of the withdrawal of large quantities of groundwater from the Chicot and Evangeline aquifers. Studies and reports prepared by the U. S. Geological Survey and the HGSD show that about 9-plus feet of land subsidence occurred in a small part of the Houston Ship Channel area with less subsidence further away from the ship channel area. In the City of Katy, total subsidence through the year 2005 is estimated to be about 1.7 feet. In the City of Rosenberg in Fort Bend County, estimated subsidence is less than 1 foot through 2005. HGSD has developed regulatory plans that have been updated through the years. Groundwater pumping in Harris and

Galveston Counties has decreased over the past 23 years as additional surface water has been utilized and less groundwater has been pumped.

A regulatory plan adopted by HGSD in 1999 prescribes general areal pumpage limits for Harris and Galveston Counties for the next three decades until 2030. The regulatory plan pumping requirements were used in estimating the availability of groundwater within the Harris and Galveston Counties area with the estimate of groundwater availability in 2010 being 351,959 acre-feet per year and decreasing to 273,628 acre-feet per year by 2030. HGSD regulatory plan essentially segments Harris and Galveston Counties into three geographic regulatory areas and mandates a reduction in groundwater pumpage per a scheduled reduction timeline. Water users located within the southeastern portion of Harris County and all of Galveston County currently must receive no more than 10 percent of their total water supply from groundwater. This limit or any updated limit adopted by HGSD will exist throughout the Region H planning period. The remainder of Harris County is segmented within two other regulatory areas. Water users within Regulatory Area 2, which comprises the central and east portion of the county, must receive no more than 20 percent of their water supply from groundwater as of year 2000. Groundwater users within the remainder of Harris County, within HGSD Regulatory Area 3, can receive no more than 70 percent of their water supplies from groundwater by year 2010, 30 percent of their water as groundwater by year 2020, and only 20 percent of their water supply from groundwater by year 2030. These regulatory limitations affect all of the WUGs (except irrigation for agricultural purposes and livestock uses) within Harris and Galveston Counties by year 2010, causing a continuing decrease in the allowable amount of groundwater that can be pumped in these two counties over time.

A regulatory plan adopted by the Fort Bend Subsidence District (FBSD) in 2003 also prescribes general areal pumpage limits for the next three decades until 2030 for Fort Bend County. The plan includes pumping limits to control subsidence within the District as needed. The FBSD regulatory plan essentially segments Fort Bend County into geographic regions and requires reductions of groundwater pumpage per a scheduled reduction timeline. Water users located within the northwestern portion of Fort Bend County (Area A) must receive no more than 70 percent of their total water supply from groundwater by 2013 and 40 percent of their water as groundwater by year 2025. This limit or a more stringent limit adopted by FBSD will exist throughout the Region H planning period. Water users within the Richmond/Rosenberg Sub Area, which comprises the central portion of the county, must receive no more than 70 percent of their water supply from groundwater as of year 2015 and 40 percent of their water as groundwater by year 2025. Groundwater users within the remainder of Fort Bend County, FBSD Regulatory Area B, must be permitted for increases in withdrawal but are not currently subject to groundwater reduction requirements. These regulatory limitations affect all of the WUGs (except irrigation for agricultural purposes) within Fort Bend County by year 2013 or 2015, creating a limit to the allowable amount of groundwater that can be pumped in the county over time.

3.2.5 Groundwater Availability in Fort Bend and Montgomery Counties

Groundwater pumpage in Fort Bend County has been increasing over the past years from approximately 69,000 acre-feet per year in 1990 to about 90,060 acre-feet per year in 2003 and 91,320 acre-feet per year in 2004, based on data provided by FBSD. Groundwater availability for the county was estimated by FBSD at about 168,025 acre-feet per year from the Gulf Coast aquifer in the year 2010 and reduced to 119,368 acre-feet per year in 2030. The estimates of groundwater availability are the largest amounts that can be considered, based on the Groundwater Reduction Plan that is a part of the rules and regulations of the FBSD. Over the past 10 years, static water levels within the county in observation wells completed in the Chicot and/or Evangeline aquifer have fluctuated some, but generally have been stable in east, west and central Fort Bend County. In the north part of Fort Bend County, there has been about 35 to 45 feet of water-level decline over the past 10 years in some wells that screen the sands in the Evangeline aquifer (refer to *Figure 3-4* through *Figure 3-7*). There have been smaller amounts of static water-level decline in other areas of Fort Bend County as shown on *Figures 3-4, 3-5 and 3-7*. A study by the U.S. Geological Survey

(Scientific Investigation Map 3081) shows that from 2004 to 2009 static water-level change in the Chicot aquifer in Fort Bend County ranged from about 20 feet of decline in the most northeast part of the county to 20 feet of rise in the easternmost part of the county.

For the Evangeline aquifer, Scientific Investigation Map 3081 shows that from 2004 to 2009, static water-level declines ranged from zero to 40 feet in Fort Bend County with the largest amount of decline in the north part of the county. The southwest and west parts of the county showed essentially no static water-level decline from 2004 to 2009.

The Gulf Coast aquifer provides groundwater to Montgomery County, with the Jasper aquifer being the principal source for about two-thirds of the county, and the Chicot and Evangeline aquifers providing water in the south central and southeast parts of the county. The estimated groundwater availability from the Gulf Coast aquifer is about 64,000 acre-feet per year, based on the groundwater management plan adopted by the Lone Star Groundwater Conservation District. The estimate of groundwater availability is, for planning purposes, the largest amount of groundwater that can utilized based on the rules of the Lone Star GCD. The estimate of groundwater availability for the Lone Star GCD may change in the future, based on additional hydrogeologic and planning data that are developed by the District. Pumpage within the county was about 55,990 acre-feet in 2000 and 52,640 acre-feet in 2004, based on data from TWDB and the Lone Star GCD. Pumpage principally is in the central and southern parts of the county along the Interstate Highway 45 (IH 45) corridor, around Lake Conroe, and in the southeastern part of the county north of the City of Humble.

Past pumpage and subsequent aquifer response to pumpage show that the development of additional groundwater beyond the estimated availability within Montgomery County will cause further potentiometric head decline in wells. Groundwater pumpage should be spread throughout the county to take advantage of developing water in areas where aquifer conditions are favorable but where the demand has not developed for the water, which is principally in the western and eastern portions of the county away from the IH 45 corridor area.

**This Page
Intentionally Left Blank**

Figure 3-4

East Fort Bend County – Static Water Levels in Wells

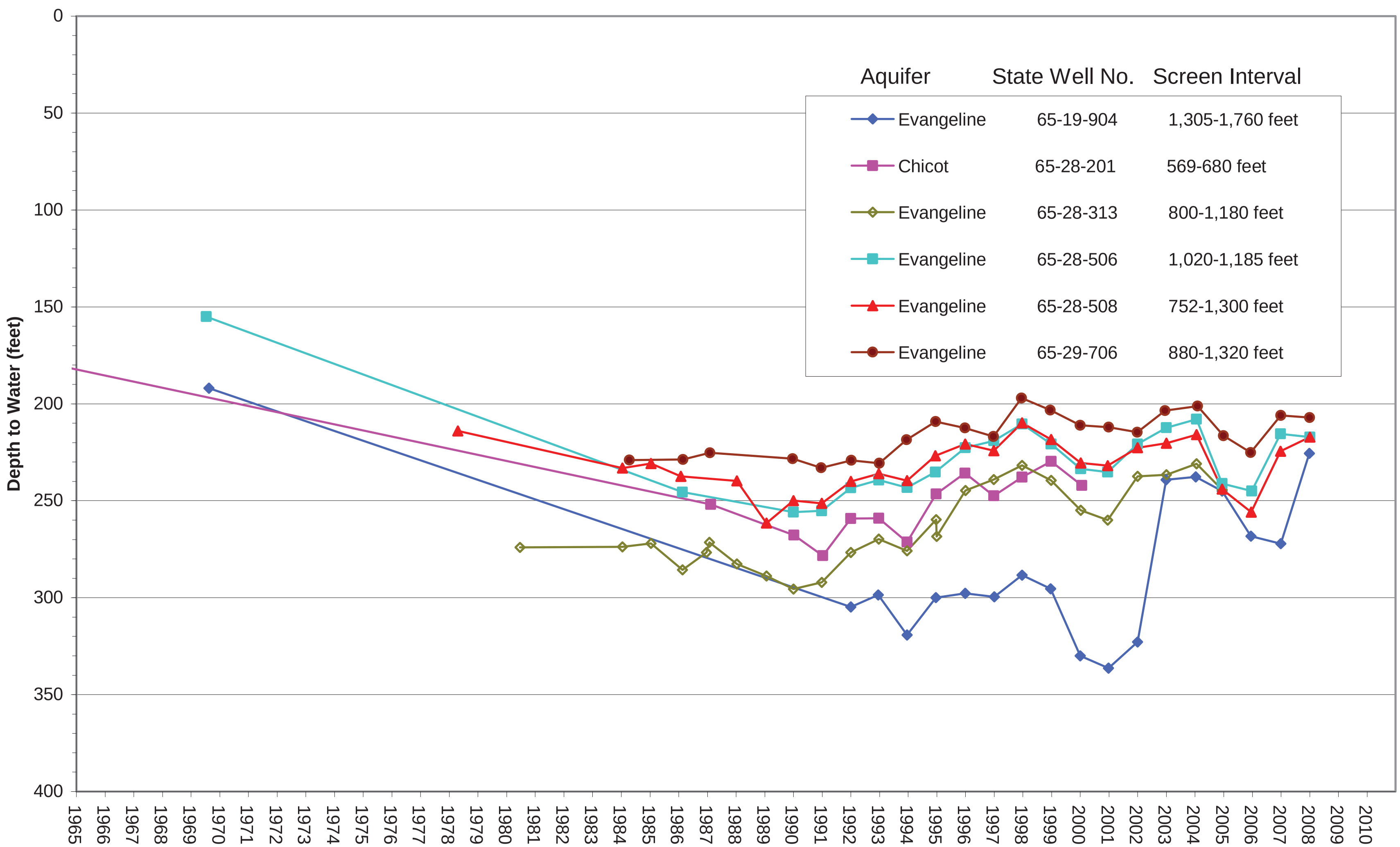


Figure 3-5

Southwest Fort Bend County – Static Water Levels in Wells

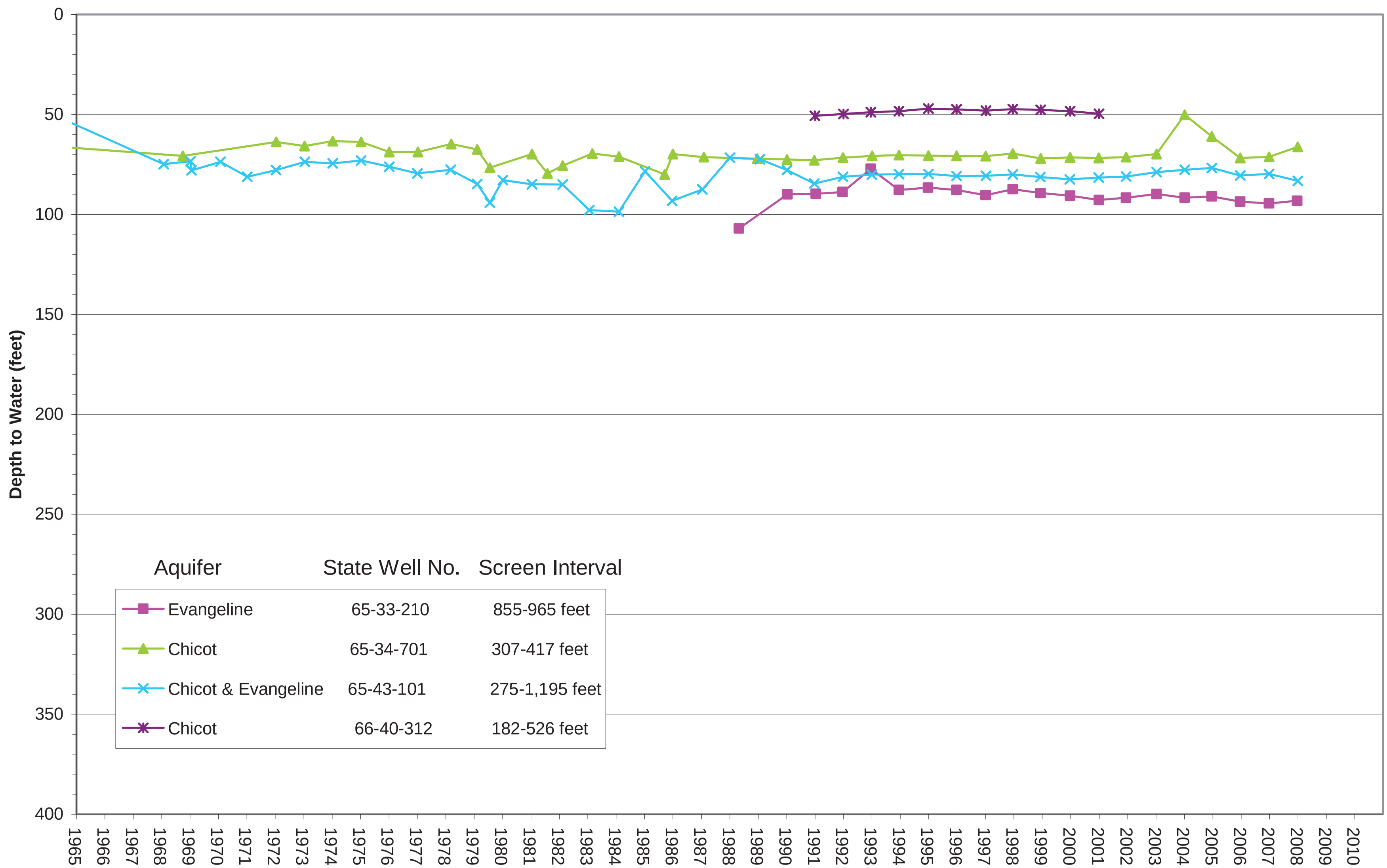


Figure 3-6

North Fort Bend County – Static Water Levels in Wells

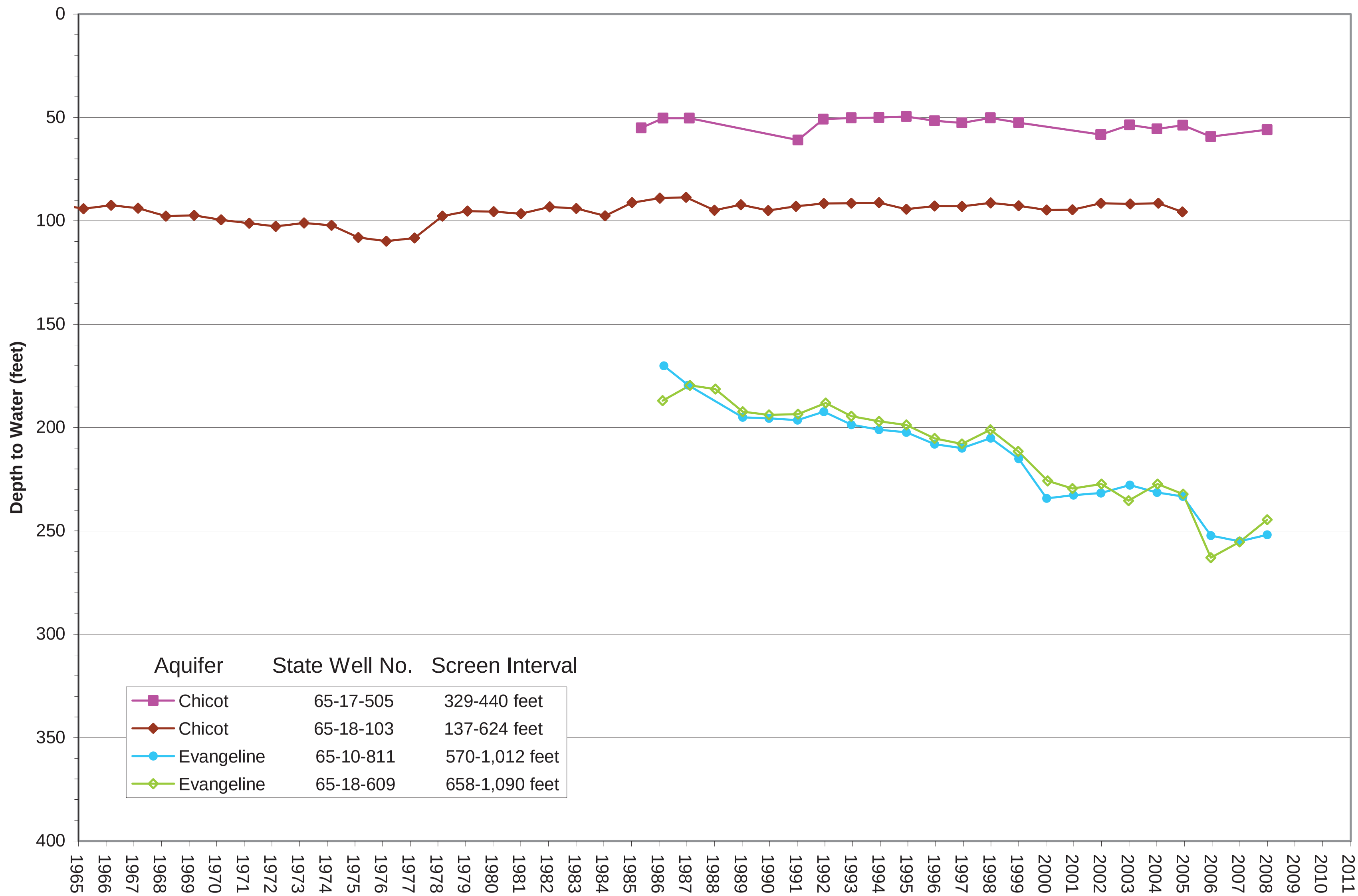
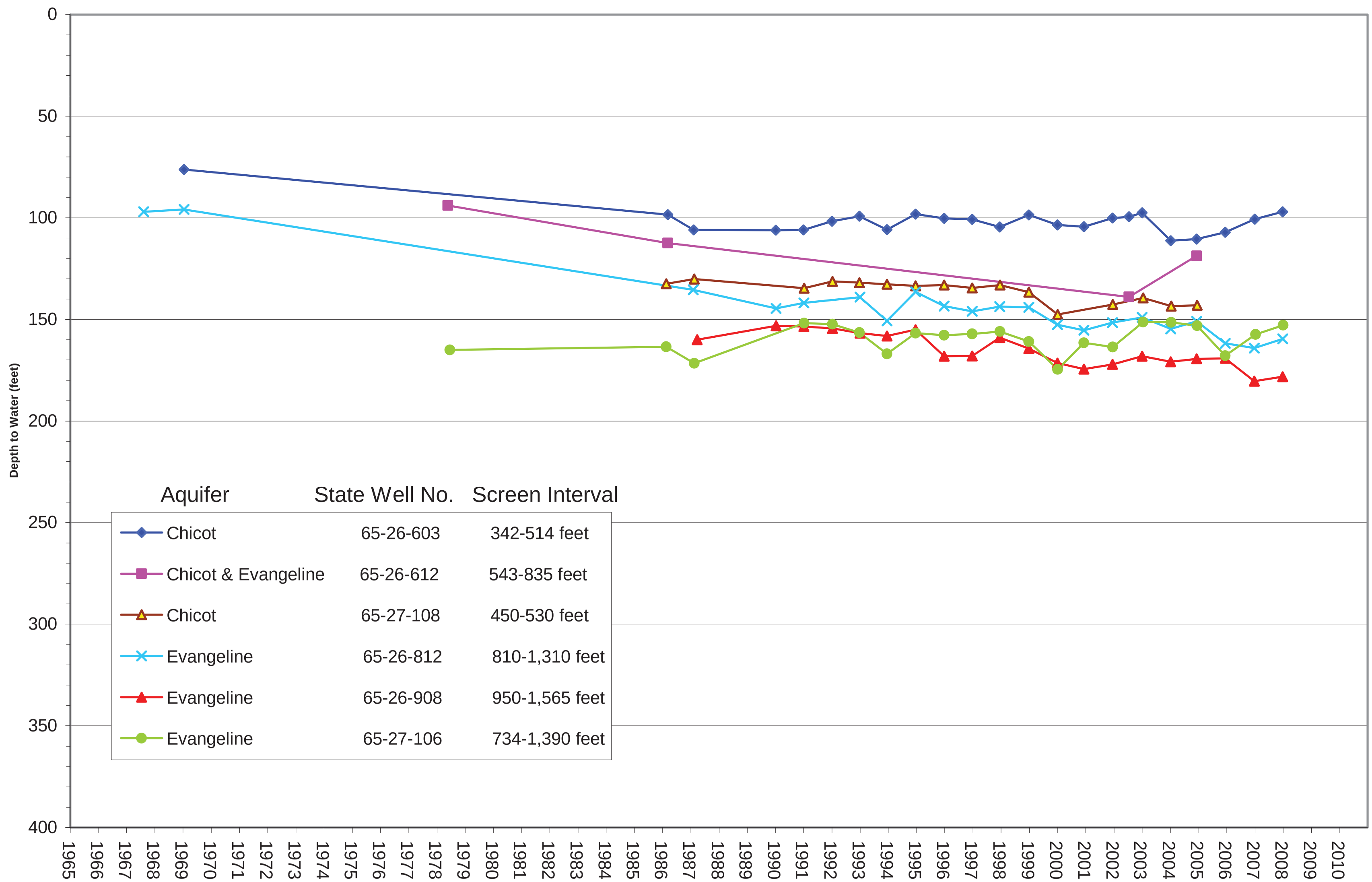


Figure 3-7

Central Fort Bend County – Static Water Levels in Wells



3.2.6 Public Supply Groundwater Usage

Region H relied on groundwater to provide approximately 50 percent or 527,006 acre-feet of the municipal water supply in 2000. Austin, Leon, Liberty, Madison, Montgomery and Waller Counties relied on groundwater to supply essentially 100 percent of the domestic and municipal demand. *Table 3-1* gives the amount of groundwater pumped for municipal purposes for each county in the region as reported by TWDB. Within the region, Harris County accounted for the most municipal groundwater usage in 2000 with 337,837 acre-feet. The next highest demands in 2000 were Fort Bend County with 68,257 acre-feet, Montgomery County with 52,333 acre-feet, and Brazoria County with 26,796 acre-feet. Municipal users represent cities and communities, parks, campgrounds, and water districts. The year 2000 had below normal precipitation for the year and during the summer months, so groundwater pumpage in 2000 was higher than normal.

According to TWDB and HGSD, in 2000 Region H relied on groundwater to provide approximately 8 percent of the water used for industrial purposes, which was approximately 51,607 acre-feet. Industrial consumption represents water that is used for manufacturing, mining, and steam-electric power. *Table 3-2* shows the amount of groundwater used for industrial purposes for each county in the region. Within the region, Harris County accounted for the most industrial groundwater usage in 2000 with approximately 20,800 acre-feet. The next highest users were Fort Bend County with 9,670 acre-feet, Liberty County with 8,952 acre-feet, and Chambers County with 4,063 acre-feet.

3.2.7 Industrial Groundwater Usage

According to TWDB and HGSD, in 2000 Region H relied on groundwater to provide approximately 8 percent of the water used for industrial purposes, which accounted for approximately 51,607 acre-feet of the groundwater used in Region H. Industrial consumption represents water that is used for manufacturing, mining, and steam-electric power. *Table 3-2* shows the amount of groundwater used for industrial purposes for each county in the region. Within the region, Harris County accounted for the most industrial groundwater usage in 2000 with approximately 20,800 acre-feet. The next highest users were Fort Bend with 9,670 acre-feet, Liberty with 8,952 acre-feet and Chambers with 4,063 acre-feet.

3.2.8 Agricultural Groundwater Usage

According to TWDB and HGSD, in 2000 Region H relied on groundwater to provide approximately 32 percent of the water used for agricultural purposes. This equaled approximately 14 percent or 92,953 acre-feet of the total groundwater used in the region. Agricultural usage represents water that is used for livestock purposes and irrigation of crops. The main agricultural crops in the region include rice, cotton and soybeans in the south and corn, cotton and hay in the north. Cattle are the principal livestock raised. *Table 3-3* shows the amount of groundwater used for agricultural purposes for each county in the region. Within the region, Fort Bend County accounted for the most agricultural groundwater usage in 2000 with 24,971 acre-feet. The next highest user is Waller County with 22,765 acre-feet followed by Harris County with approximately 20,800 acre-feet.

**This Page
Intentionally Left Blank**

Table 3-1

Municipal Groundwater Demand From 2000 TWDB Data

County	Total Groundwater Used (acre-feet)	Groundwater Used for Municipal Purposes (acre-feet)	Percent of County's Total Groundwater Used for Municipal Purposes	Percent of County's Municipal Water Demand Supplied by Groundwater
Austin	13,004	3,569	27.4	100.0
Brazoria	36,925	26,796	72.6	66.9
Chambers	6,355	2,014	31.7	45.5
Fort Bend	102,898	68,257	66.3	98.8
Galveston	5,791	5,163	89.2	14.0
Harris	379,209	337,837	89.1	42.1
Leon	4,849	1,883	38.8	100.0
Liberty	22,113	9,401	42.5	100.0
Madison	3,180	2,621	82.4	100.0
Montgomery	55,403	52,333	94.5	100.0
Polk	4,626	3,952	85.4	68.0
San Jacinto	2,931	2,742	93.6	96.8
Trinity	1,370	1,200	87.6	65.6
Walker	5,386	4,625	85.9	31.4
Waller	27,526	4,613	16.8	100.0
Total	**671,566**	**527,006**	**78.5**	

Table 3-2

Industrial Groundwater Demand From 2000 TWDB Data

County	Total Groundwater Used (acre-feet)	Groundwater Used for Industrial Purposes (acre-feet)	Percent of County's Total Groundwater Used for Industrial Purposes	Percent of County's Industrial Water Demand Supplied by Groundwater
Austin	13,004	204	1.6	97.6
Brazoria	36,925	2,139	5.8	1.9
Chambers	6,355	4,063	63.9	8.8
Fort Bend	102,898	9,670	9.4	13.7
Galveston	5,791	200	3.5	0.5
Harris	379,209	20,800	5.5	6.8
Leon	4,849	1,410	29.1	61.7
Liberty	22,113	8,952	40.5	100.0
Madison	3,180	211	6.6	100.0
Montgomery	55,403	2,800	5.1	62.1
Polk	4,626	419	9.1	79.4
San Jacinto	2,931	75	2.6	100.0
Trinity	1,370	8	0.6	100.0
Walker	5,386	508	9.4	20.1
Waller	27,526	148	0.5	100.0
Total	**671,566**	**51,607**	**7.7**	

Table 3-3

Agricultural Groundwater Demand From 2000 TWDB Data

County	Total Groundwater Used (acre-feet)	Groundwater Used for Agricultural Purposes (acre-feet)	Percent of County's Total Groundwater Used for Agricultural Purposes	Percent of County's Agricultural Water Demand Supplied by Groundwater
Austin	13,004	9,231	71.0	75.5
Brazoria	36,925	7,990	21.6	8.0
Chambers	6,355	278	4.4	0.7
Fort Bend	102,898	24,971	24.3	49.9
Galveston	5,791	200	3.5	3.9
Harris	379,209	20,800	5.5	89.8
Leon	4,849	1,556	32.1	69.7
Liberty	22,113	3,760	17.0	13.0
Madison	3,180	348	10.9	40.0
Montgomery	55,403	270	0.5	46.9
Polk	4,626	255	5.5	54.0
San Jacinto	2,931	114	3.9	12.0
Trinity	1,370	162	11.8	18.6
Walker	5,386	253	4.7	40.0
Waller	27,526	22,765	82.7	98.4
Total	**671,566**	**92,953**	**13.8**	

This Page

Intentionally Left Blank

3.2.9 Groundwater Drought Susceptibility

The aquifers within Region H generally have high transmissivity rates or values and are less susceptible to drought because there is a very large amount of water in storage in the aquifers to serve as a buffer, which means the static water levels do not fluctuate drastically during a severe drought. The static water levels recover following a drought when groundwater withdrawals are less. In general, Region H water suppliers have established drought triggers for their groundwater systems as a function of system capacity (wells, pumps, storage, etc.) as opposed to other regions where static aquifer groundwater levels are used as drought triggers.

3.2.10 Groundwater Availability Summary

Groundwater has been an important water resource within Region H for the past 100 years. The major Carrizo-Wilcox and Gulf Coast aquifers and minor Sparta, Queen City, Yegua-Jackson, and Brazos River alluvium aquifers should continue to provide an important water resource to the region that will be used in combination with surface water to help satisfy the regional water demand. Water of good quality continues to be available from the aquifers and should continue in the future with prudent resource management. Groundwater supplies were calculated for each county and basin from various sources and are provided in *Table 3A.1*.

For aquifers in Fort Bend, Galveston and Harris Counties, which are within the jurisdictions of FBSD and HGSD, the available supplies shown in *Table 3A.1* represent the regulated groundwater supplies set by the districts and not necessarily the amount of water available from the aquifer. Water User Groups that are not regulated by the subsidence districts, such as irrigators and small domestic well users, would be allowed to withdraw water in excess of these supplies in order to meet their demands. The certified groundwater management plan for the Bluebonnet Groundwater Conservation District was used as a basis for estimating groundwater availability in Austin and Walker Counties. The certified groundwater management plan for the Lone Star Groundwater Conservation District was used as a basis for determining or estimating groundwater availability in Montgomery County.

Groundwater availability within HGSD is consistent with the HGSD groundwater reduction plan through 2030. Groundwater availability within HGSD may change a modest amount after 2030 depending on updates to the groundwater reduction plan in future years. For this current planning effort it is assumed that groundwater availability will remain the same after 2030 within HGSD with the understanding that if the district’s groundwater reduction plan is revised at a future date, the estimates of groundwater availability after 2030 may also be revised.

Groundwater availability within Austin, Waller and Walker Counties is based on information provided by the Bluebonnet Groundwater Conservation District. The district is participating in the GMA-14 effort which is developing desired future conditions for the aquifers. That planning effort is to be completed by September 2010. Groundwater availability in Austin, Waller and Walker Counties may change a modest amount based on the results of the GMA-14 desired future conditions planning effort. If that occurs, revised estimates of groundwater availability will be included in future Region H planning efforts.

3.3 Identification of Surface Water Sources

As stated in *Chapter 1*, surface water sources in Region H consist of reservoir storage, ROR supply from three rivers (the Trinity, San Jacinto and Brazos) and four coastal basins (the Neches-Trinity, Trinity-San Jacinto, San Jacinto-Brazos and Brazos-Colorado). The water supply information presented is based on the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAM), updated specifically for the Regional Water Plan. A map showing major surface water sources that serve Region H is included as *Figure 3-8*.

3.3.1 Available Surface Water

Surface water availability was estimated using the TCEQ WAM for the river basins within Region H. The WAMs use the Water Rights Analysis Package (WRAP), developed at Texas A&M University, to simulate diversions under current and future conditions using historical rainfall and evaporation data (the model does not increase diversion amounts over time, as will actually occur). Instead, the model simulates one set of monthly diversion targets attempted annually against a historical inflow dataset, which is typically 50 years long and varies each year. The drought of record (DOR) for most of Texas occurred in the 1950s and is reflected in the historic dataset for each basin. Water diversions are modeled according to the parameters of each particular water right and are taken in priority order, such that the most senior water rights are satisfied before junior rights are allowed to divert water. Output files are compared by reviewing the statistical frequency of meeting diversion amounts or target instream flow levels.

In the 2006 Region H Water Plan the reliability of run-of-river water rights was evaluated in terms of reliable yield; that is, the least amount of water diverted amongst all of the calendar years modeled. While this assumption is adequate for water users that may not require steady monthly diversions during a drought of record, other users such as municipal and industrial demands typically require a higher degree of water availability. To address this concern, the 2011 Region H Water Plan evaluated water rights on a monthly basis in addition to an annual basis. The monthly firm yield of run-of-river water rights was evaluated by iteratively reducing the annual target diversions until no monthly shortages occur throughout the simulation period. The reliable yield of a water right is the least amount of water diverted among all of the calendar years modeled.

For reservoirs, an additional step is required to determine firm yield. Water stored in reservoirs allows diversions to continue during periods of drought; however, diverting at high rates rapidly depletes storage. To find the optimal target for a reservoir an iterative process is used, modeling the permitted diversion first at its full authorized amount and then at reduced target diversions until a yield is identified that is met throughout the simulation period.

There were originally eight WAM scenarios (referred to as model runs) simulated under the TCEQ program. The Guidelines for Regional Water Planning require the use of WAM Run 3, full-authorized diversion of current water rights with no return flows, when determining the supply available to the region. This is a very conservative approach, since diversions for municipal and manufacturing users typically return up to 60 percent of that water to streams as treated wastewater effluent. However, the majority of water rights do not address return flows to source streams, implying a right to full consumptive use. The Region H Planning Group adopted the Region G – Brazos G WAM which modified the Brazos River WAM Run 3 to allow for some return flows from wastewater plants in the Brazos River basin. Further discussion of the Brazos G WAM is described in detail in *Section 3.3.1.6 Brazos River Basin*.

Table 3-4 summarizes the projected yield from surface water supply sources currently available to Region H. The total estimated 2060 yield available to Region H (approximately 2,641,400 acre-feet per year) is approximately equal to the estimated total in the 2006 Regional Water Plan, but the distribution between permits has changed. The yield of several reservoirs decreased due to the projected storage loss as a result of sedimentation, but additional water rights were added as a result of the WAM modeling. The major water rights and modeling assumptions for each basin are discussed in detail below.

Figure 3-8

Major Surface Water Sources

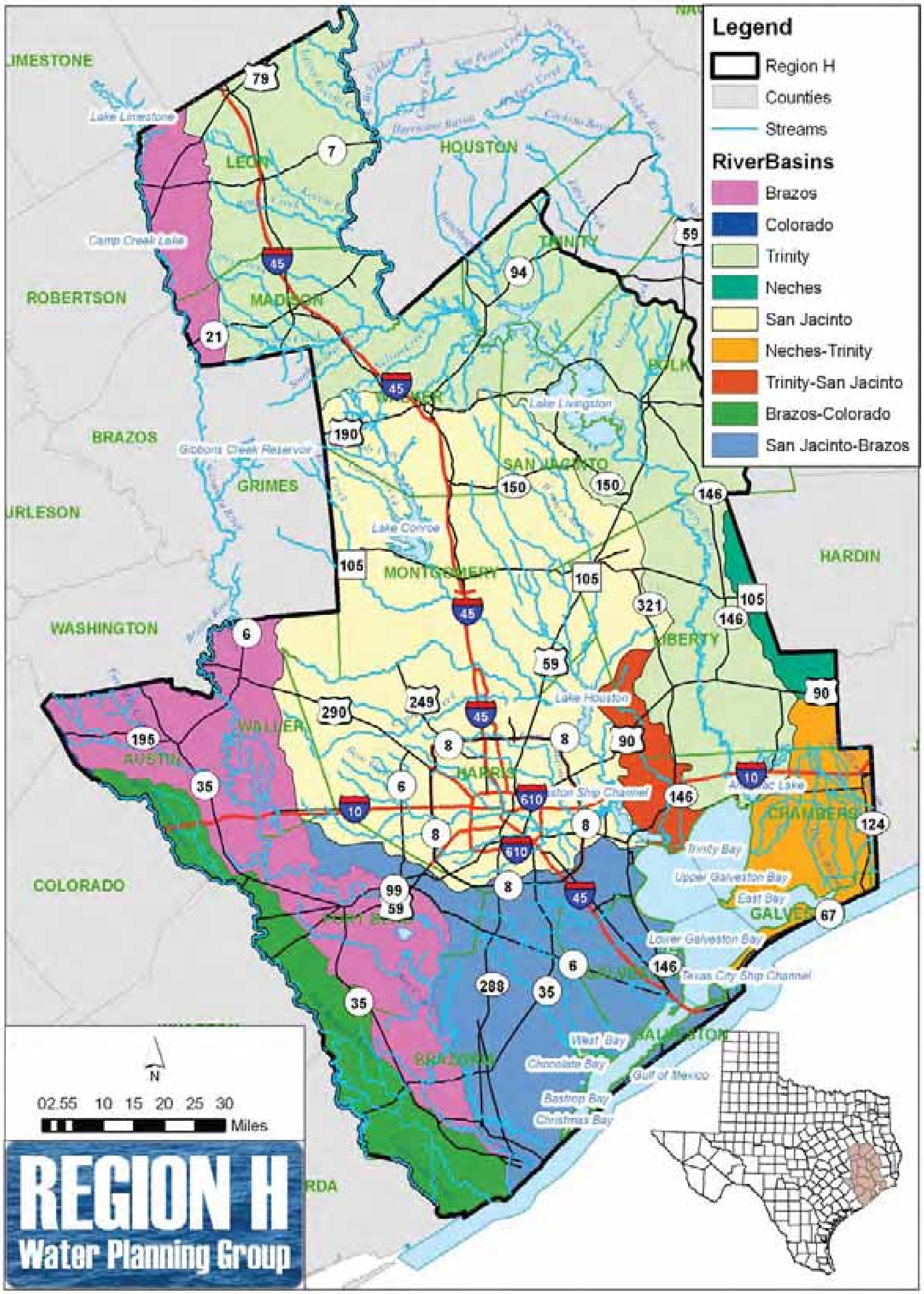


Table 3-4
Current Surface Water Supply Sources Available in Region H

Projected Year 2060 Available Yield	
Basin/Reservoir/Run-of-River	**(acre-feet/year)**
Sam Rayburn Reservoir and Neches Basin Supplies[1]	64,177
Neches-Trinity Coastal Basin	21,754
Trinity Basin	
Lake Livingston/Wallisville	1,344,000
Run-of-River, Lower Basin	224,530
Trinity – San Jacinto Coastal Basin	34,313
San Jacinto River Basin	
Lake Houston	168,000
Lake Houston Additional Yield	5,000
Lake Conroe	74,300
Run-of-River	55,000
San Jacinto – Brazos Coastal Basin	33,051
Brazos River Basin	
BRA/COE System[2]	155,031
Run-of-River, Lower Basin	418,311
Brazos – Colorado Coastal Basin	12,019
Local Supplies (i.e. Stock ponds, etc), all basins	31,895
Total Existing Surface Water Supply Available to Serve Region H	**2,641,381**

[1] The total yield of Sam Rayburn Reservoir is approximately 820,000 acre-feet/year. The value shown only includes the portion currently contracted to customers within Region H.

[2] This amount is based on current contracts within Region H. The total yield of the BRA/COE system is approximately 650,000 acre-feet/year.

The TCEQ WAM models were updated to add new water rights and reflect the effects of sedimentation on reservoirs. Reservoirs reduce the velocity of the streams they impound, causing suspended soil particles to settle; over time, storage volume is lost due to this accumulation. Sedimentation rates were determined and applied to on-channel reservoirs to calculate the year 2000 and year 2060 storage volumes (see *Table 3-5*). The WAM model was then run under each storage condition. The storage capacity lost to sedimentation reduced the yield of most reservoirs in the year 2060. This change in yield was represented as a linear decline over time in the summary tables.

Table 3-5

Water Supply Reservoir Capacities

Reservoir	Surface Elev. (feet msl)	Storage Capacity Original (ac-ft)	2000 (ac-ft)	2060 (ac-ft)
Trinity Basin				
Livingston	131.0	1,741,867	1,738,326	1,717,083
Anahuac	5.0	35,300	25,781	25,691
San Jacinto Basin				
Houston	44.5	133,990	131,547	106,409
Conroe	201.0	416,228	414,143	377,567
Brazos Basin – BRA/COE System				
Aquilla	537.5	52,400	45,319	20,437
Alan Henry	2220.0	115,937	94,808	39,478
Belton	594.0	457,600	437,656	415,255
Georgetown	791.0	37,100	36,904	36,519
Granger	504.0	82,000	52,525	20,973
Stillhouse Hollow	622.0	235,700	227,825	216,165
Granbury	693.0	153,500	129,011	87,743
Possum Kingdom	987.0	724,738	540,340	398,000
Whitney	533.0	627,100	554,203	504,153
Limestone	363.0	217,494	208,017	172,405
Proctor	1162.0	59,400	55,457	49,599
Somerville	238.0	160,100	147,104	126,869

The total supply available from each source available to Region H is included in *Table 3A.1*, *Current Water Sources*, in *Appendix 3A*. In general, *Table 3A.1* indicates the maximum amount of water supply that could be obtained during DOR conditions from each supply source. This information was compiled from existing contracts and water rights in Region H, the updated WAM for surface water supplies and groundwater studies addressed in *Section 3.2* of this chapter. Not all of the sources listed in *Table 3A.1* are exclusively available to Region H. Reservoirs located in the upper portions of the Brazos, Trinity and Neches basins are shown with their firm yield, but the portion of that yield available within Region H is limited to the contracted amounts.

3.3.1.1 Neches-Trinity Coastal Basin

Surface supplies in the Neches-Trinity Coastal River Basin were modeled using the TCEQ WAM Run 3 model. Of the water right permits totaling 70,175 acre-feet per year from the Neches-Trinity coastal basin, 40,191 acre-feet per year were reliable during the DOR. Approximately one-third of this firm total is the U.S. Fish and Wildlife Service water right for the Anahuac National Wildlife Refuge. Water rights yielding over 500 acre-feet per year for consumptive uses (all for irrigation) are listed in *Table 3A.1* and have a total reliable yield of 21,754 acre-feet per year. This is almost identical to the basin yield estimated in the 2006 Regional Water Plan (21,701 acre-feet per year). The WRAP input file for this model is included in *Appendix 3B*.

3.3.1.2 Trinity River Basin

The Trinity River Basin contains 32 major reservoirs, including two Region H sources, Lake Livingston/Wallisville and Lake Anahuac. The permitted yield of Lake Livingston was diminished using WAM Run 3, but showed a firm yield in excess of the permit amount in the TCEQ WAM Run 1 (full use with expected return flows). In the 2006 Region H Water Plan it was assumed that sufficient return flow from the Upper Trinity Basin would be available throughout the planning period to make Lake Livingston's permitted yield firm. As part of the 2011 Region Water Plan Update, a special study was included to analyze the upper basin demands, reuse strategies and return flows projected in the 2006 Region C Water Plan and the effects on the firm yield of Lake Livingston. The study also included updates to reuse strategies and projected return flow estimates identified in the 2008 Region C Water Conservation and Reuse Study. The 2011 Region H plan identified the following:

- Projected Return Flows Available at the Oakwood Gage (CP 8TROA)
- Firm Yield of Lake Livingston during each planning period decade
- Necessary level of return flows required to make the permitted yield of Lake Livingston firm

The firm yield of the Lake Livingston water rights is expected to decrease from the full permitted yield of 1,344,000 acre-ft per year in the year 2010 to 1,265,000 acre-ft per year in the year 2030. The decrease in firm yield is the result of increasing amounts of reuse projected in the upper basin, reducing the amount of return flows available to Region H. The firm yield is then projected to increase after 2030 as Region C begins to import water supplies to meet growing demands. By the year 2050 the permitted yield of Lake Livingston is projected to be firm. The projected reductions in the firm yield of Lake Livingston are anticipated to be a conservative estimate, as the upper basin is not expected to implement all of the reuse strategies recommended in the 2006 Region C Plan. The results of the study are summarized below:

- Minimum upper basin net return flows of 253,055 acre-ft per year projected in 2030
- Minimum return flows available to Region H in 2030 of approximately 185,500 acre-ft per year
- Firm yield of Lake Livingston water rights are reduced in decades 2020, 2030 and 2040
- Minimum firm yield of Lake Livingston water rights is approximately 1,265,000 acre-ft per year in 2030
- Minimum level of return flows required to make Lake Livingston water rights firm is approximately 285,000 acre-ft per year in 2060

A summary of the return flow analysis and Lake Livingston yield analysis was prepared to coordinate the findings of this study with Region C. The summary report is included in *Appendix 3C*. The WRAP input files for this analysis are included in *Appendix 3B*.

The reliability of three lower Trinity River ROR supplies came from a set of "fixed right" agreements. The agreements are between the Trinity River Authority (TRA) and the City of Houston (COH) (who jointly own the water rights for Lake Livingston) and three providers of irrigation-water. These irrigation-water providers are the Chambers-Liberty Counties Navigation District (CLCND), the American Rice Growers Co-op Association (Dayton Canal), and the Lower Neches Valley Authority (LNVA) which owns and operates the Devers Canal. Pursuant to the fixed right agreement CLCND, Dayton Canal, and Devers Canal are entitled to divert up to 88,820, 33,000, and 86,000 acre-feet per year, respectively. These diversions occur from the Trinity River and some tributaries of the Trinity River. Although these diversions physically take place downstream of Lake Livingston, they are senior in priority to the Lake Livingston water rights.

Approximately 27,500 acre-feet per year of the Devers Canal's 86,000 acre-feet per year is part of Lake Livingston yield and is reflected in the plan as a contractual commitment of the TRA. Fifty-six thousand, of the remaining 58,500 acre-feet per year of the Devers Canal yield, was purchased by the San Jacinto River Authority (SJRA), for use in the Trinity-San Jacinto Coastal Basin.

Houston recently purchased outright the entire amount of the Dayton Canal fixed right agreement. Additionally, Houston holds another water right in the Trinity River Basin with an authorized diversion of 45,000 acre-feet per year from the Old River Tributary of the Trinity River. The reliable yield of the run-of-river right is 26,510 acre-ft per year.

In addition to the 58,820 acre-feet per year in the fixed right agreements, CLCND also owns the rights (39,613 acre-feet per year, of which 17,700 acre-feet per year is reliable) to the Turtle Bayou (Lake Anahuac) supply in the Trinity River Basin. The SJRA purchased a portion (30,000 acre-feet per year) of CLCND's fixed right in 2001. The ownership of the Trinity River Basin supplies is summarized in *Table 3-6*.

Table 3-6

Ownership of Trinity River Basin Supplies

Owner	**Source**	**Permitted Amount (acre-feet/year)**	**2060 Reliable Yield (acre-feet/year)**
COH	Lake Livingston/Wallisville System	940,800	940,800
TRA	Lake Livingston/Wallisville System	403,200	403,200
COH	Trinity River and Big Ditch	38,000	33,000
COH	Old River Tributary	45,000	26,510
SJRA	Trinity River	86,000	86,000
CLCND	Trinity River	73,334	58,820
CLCND	Lake Anahuac	39,613	17,700
LNVA	Trinity River	2,500	2,500
Total		1,628,447	1,568,530

The supply amounts shown for the Lake Livingston/Wallisville Saltwater Barrier system are the total permitted diversions for each body of water, as discussed in the paragraph above. The City of Houston has a permit to divert 902,800 acre-feet per year from Lake Livingston and 38,000 acre-feet per year from the Wallisville Saltwater Barrier. The TRA has a permit to divert 351,600 acre-feet per year from Lake Livingston and 51,600 acre-feet per year from the Wallisville Saltwater Barrier. Not all of this water would be available to Region H. Of the amount that is owned by the TRA, approximately 26,900 acre-feet per year is committed outside of Region H. In addition, it should be noted that physical diversions are not made from the Wallisville Saltwater Barrier, but the combined yield of Lake Livingston is increased when operated in conjunction with the Wallisville Saltwater Barrier. The increase in yield is a result of the barrier precluding the need for salinity reduction releases for downstream senior water rights.

3.3.1.3 Trinity-San Jacinto Coastal Basin

The surface water supply in the Trinity-San Jacinto Coastal Basin was modeled using WAM Run 3. Water right permits totaling 44,473 acre-feet per year from the Trinity-San Jacinto Coastal Basin were analyzed using the water availability model. Of this, 34,973 acre-feet per year was found to be reliable during the DOR. Water rights yielding over 500 acre-feet per year for consumptive uses are listed in *Table 3A.1* located in *Appendix 3A*, and total 34,313 acre-feet per year. NRG's Cedar Bayou plant has a permit to divert 30,000 acre-feet per year of saline water from Cedar Bayou, which accounts for most of the firm supply. The remaining 4,313 acre-feet per year of reliable yield are irrigation rights. The WRAP input file for this model is included in *Appendix 3B*.

3.3.1.4 San Jacinto River Basin

The surface water supply in the San Jacinto River Basin was modeled using WAM Run 3. Water right permits totaling 374,544 acre-feet per year from the San Jacinto River Basin were analyzed using the water availability model. Of the 374,544 acre-feet per year permitted, 302,300 acre-feet per year was found to be reliable during the DOR. In addition to the surface water rights, the Indirect Reuse Water Right 10-5809 was issued in June 2004 and included in *Table 3A.1* (*Appendix 3A*). The WRAP input file for this model is included in *Appendix 3B*.

The only reliable ROR diversion right included for the basin is the SJRA permit for 55,000 acre-feet per year. SJRA diversions are physically made from Lake Houston and are the primary source of water for the SJRA Highlands Canal System. The water right is included in the TCEQ model as a run-of-river right as originally permitted. However, the reliability of the water right is based on a water contract between the City of Houston and the San Jacinto River Authority. As a result, the 2011 Region H Water Plan recommends the full permitted amounts of 55,000 acre-ft per year for the SJRA run of river permit and 168,000 acre-ft per year for the original Lake Houston permit as reliable in accordance with the 2001 and 2006 Region H Water Plans. Other reliable run-of-river water rights in the basin were either for recreation or less than 500 acre-feet per year and were not included in *Table 3A.1* (*Appendix 3A*). In September 2009, the TCEQ granted an additional 80,000 acre-feet of run-of-river split between the City of Houston and the SJRA. Physically, diversions will be made from Lake Houston at existing COH and SJRA pump stations. The supply is not 100% reliable but will allow for the use of the in-basin supply, when available, in lieu of transferring water from the Trinity Basin.

Lake Houston

The available yield of Lake Houston is determined from two permitted diversions. The original permitted diversion of Lake Houston, 168,000 acre-feet per year, is firm throughout the planning period. This is due to the downstream location of Lake Houston on the San Jacinto River and its seniority relative to other major water rights in the basin. The COH owns the entire original permitted yield from Lake Houston. The 2006 Region H Water Plan included additional yield from Lake Houston as a recommended water management strategy. In 2008, the TCEQ granted the additional yield from Lake Houston (Permit No. 5807) with a permitted diversion of 28,200 acre-feet per year. The 2011 Plan has been updated to include the additional yield from Lake Houston as part of the available supply. Using the 2060 sedimentation condition, only an additional 5,000 acre-feet per year is available from Lake Houston as firm supply. The total supply available from Lake Houston in 2060 (173,000 acre-ft per year) is the sum of the supply available from the original permit (168,000 acre-feet per year) and the additional yield permit (5,000 acre-feet per year).

Lake Conroe

The Lake Conroe yield declined from its permitted amount of 100,000 acre-feet per year to 74,300 acre-feet per year due to the WAM Run 3 condition and the year 2060 storage capacity estimate. The WAM Run 3 assumption that no return flows will be available greatly impacted the streamflows in the lower San Jacinto Basin. Lake Houston is senior to Lake Conroe, which results in Lake Conroe passing inflows when Lake Houston storage levels drop. As a result of the removal of return flows from the model, Lake Conroe passes more inflows in order to keep Lake Houston full. Also, the bathymetric survey used to determine the sedimentation rate for Lake Conroe identifies a potential discrepancy in the original volumetric capacity of Lake Conroe. This discrepancy likely resulted in a higher than actual sedimentation rate, which also reduces the yield over a 60-year period. The COH and SJRA jointly own the water rights for Lake Conroe. The COH's portion is 66,667 acre-feet per year from Lake Conroe, with an estimated year 2060 reliable yield of 49,038 acre-feet per year. The SJRA portion is 33,333 acre-feet per year from Lake Conroe, with an estimated year 2060 reliable yield of 25,262 acre-feet per year.

Entergy (formerly Gulf States Utility Company) has a contractual agreement with SJRA to divert water from Lake Conroe into Lewis Creek Reservoir. In the TCEQ WAM Run 3, this permit is represented as a separate water right. This was corrected in the 2006 Plan and represented as a contract.

3.3.1.5 San Jacinto-Brazos Coastal Basin

Surface supply in the San Jacinto-Brazos Coastal Basin was modeled using Run 3. Water right permits totaling 120,919 acre-feet per year from the San Jacinto-Brazos Coastal Basin were analyzed using the water availability model. Of the 120,919 acre-feet permitted, only 37,569 acre-feet per year was found to be reliable during the DOR. Water rights yielding over 500 acre-feet per year for consumptive uses are listed in *Table 3A.1* of *Appendix 3A*, and total 33,051 acre-feet per year. NRG's Webster plant had a permit to divert 4,440 acre-feet per year of saline water. Since 2006 the permit has been canceled at the request of NRG. The Gulf Coast Water Authority (GCWA) owns two water rights in the San-Jacinto Basin including one water right recently acquired from the former Chocolate Bayou Water Company (CBWC). The GCWA water right C5169 was represented in the 2006 Region H Water Plan with a reliable yield of 3,842 acre-ft per year. However, the water right is used for impoundment in the Sugarland area and not as a source to supply water contracts according to GCWA. The GCWA system availability is discussed further in *Section 3.3.1.6.* To reflect this, the availability of the water right recommended in the 2011 Region H Water Plan is 0 acre-ft per year. The reliable yield of water right C5357 was reduced from 17,600 acre-ft per year in the 2006 Region H plan to 15,930 acre-ft per year in the 2011 Plan. The firm portion of this supply is 2,120 acre-feet per year. The WRAP input file for this model is included in the Brazos Basin WRAP input file in *Appendix 3B*.

3.3.1.6 Brazos River Basin

Surface supply in the Brazos River Basin was modeled by the Consultant for the Brazos G Water Planning Group. A survey of wastewater plant operators within the Brazos Basin was conducted to determine the amount of anticipated reuse during the planning period. Based on the survey results, WAM Run 3 was modified to allow 65,256 acre-feet per year (58.3 million gallons per day [mgd]) of return flows in the model in the 2010 decade and 128,503 acre-feet per year (114.7 million gallons per day [mgd]) of return flows in the 2060 decade. There are water right permits in the Brazos River Basin of Region H totaling 866,351 acre-feet per year. The modeled annual reliable yield of these rights was 488,419 acre-feet per year. Water rights yielding over 500 acre-feet per year for consumptive uses are listed in *Table 3A.1* of *Appendix 3A* and total 418,311 acre-feet per year. The WRAP input file for this model is included in *Appendix 3B*.

There was a significant reduction in expected yield from the lower Brazos Basin despite the allowance of limited return flows in the model. The largest decline was seen in the Dow Chemical water right, with an authorized diversion of 321,856 acre-feet per year. The reliable yield of this right was reduced from 148,052 acre-feet per year in the 2006 Plan to 137,475 acre-feet per year in the 2011 Plan due to reduced return flows. Similarly, the Brazosport Water Authority water right yield decreased from 23,017 acre-feet per year to 16,492 acre-feet per year. Despite the yield reductions for several water rights in the basin, some firm yields increased. The Richmond Irrigation Company water right was estimated at 29,920 acre-feet per year in the 2006 Region H Water Plan and was not reduced under this model. Similarly, NRG Energy Inc's yield from Smithers Lake remained unchanged at 34,300 acre-feet per year.

The Gulf Coast Water Authority holds three water rights in the Brazos Basin, including a recently purchased water right previously owned by the former Chocolate Bayou Water Company. In the 2006 Region H Water Plan, the combined reliable yield of the three rights was estimated at 235,005 acre-feet per year based on the minimum annual diversion during the drought of record. Under this model scenario, the estimated reliable yield fell to 229,786 acre-feet per year due to lower estimated return flows from the upper basin. The combined firm yield of the three water rights is approximately 78,344 acre-ft per year when analyzed on a monthly basis. This is the result of water rights C5171 and C5322, which are not reliable during the months of July and August during the Drought of Record.

After discussing the water availability with the GCWA, a monthly analysis of the GCWA contracts and reliable yields was conducted. This allowed the reliable yield of the water rights to be analyzed as a system rather than individually. In addition to the three water rights in the Brazos Basin, the analysis also included reliable yield from a GCWA water right in the San Jacinto – Brazos Basin, water supply contracts from the BRA and existing contracts for future supply from the GCWA. The existing contracts for future supply consist of several contracts that will be available after 2015 once the required infrastructure is constructed to treat additional raw water from the GCWA. A strategy will be developed in *Chapter 4* to allocate the supplies provided to these contracts. The analysis concluded that from the combination of sources, the GCWA was able to provide 256,838 acre-feet per year to meet contractual demands. Of this supply, 198,323 acre-feet per year is supplied from the three run-of-river water rights in the Brazos Basin. The remaining supplies come from a water right in the San Jacinto – Brazos and supplies contracted from the BRA.

Brazos River Authority/U.S. Army Corps of Engineers System (BRA/COE)

The Brazos River Authority stores water in a system of water supply and flood control reservoirs in the middle and upper basins. The Authority owns Possum Kingdom, Granbury, and Limestone Reservoirs. The U.S. Army Corps of Engineers owns the remaining reservoirs in the system. The supply amounts included in *Appendix 3A* for these facilities were provided by the Brazos G Water Planning Group. The combined firm yield of the BRA Reservoirs is estimated at 650,477 acre-feet per year assuming 2010 sedimentation conditions. The portion of this yield available to Region H is reflected in supply contracts between the BRA and customers in this region. Those contracts total 155,030 acre-feet per year.

3.3.1.7 Brazos-Colorado Coastal Basin

The Brazos-Colorado Coastal Basin contains the lower reach of the San Bernard River. The model for this basin was included in the Colorado River WAM, prepared by RJ Brandes Co. for the TCEQ. Two water rights were identified within Brazoria County, and the WAM Run 3 results for these rights are identified in this report. A year 2060 iteration was not made for this basin because sedimentation was not anticipated in the off-channel reservoir associated with these rights. The WRAP input file for this model is included in *Appendix 3B*.

3.3.1.8 Lake Sam Rayburn

A water supply allocated from Lake Sam Rayburn in the Neches River Basin, listed in *Table 3A.1,* represents contracted amounts from the Lower Neches Valley Authority by the Trinity Bay Conservation District, the Bolivar Peninsular SUD and irrigators in Chambers and Liberty Counties. The full yield of the lake was obtained from the East Texas Water Planning Group, and the contract amounts are reflected in both regional plans.

3.3.1.9 Local Supplies

Local supplies (stock ponds, catchments, etc.) that cannot be related to reported groundwater or surface water use are currently meeting certain livestock and mining demands. The TCEQ allows a landowner to impound up to 200 acre-feet of water without obtaining a water right. Numerous local supplies are included as surface water supplies in *Appendix 3A*.

3.3.2 Discussion of Modeling Results

It is important to note that the TCEQ WAMs are based on historic hydrologic data to account for rainfall and evaporation losses. While the model provides an approximation of water right availability during the drought of record, the model does not predict water right availability in future droughts which may have different hydrologic conditions. The models generally do not include return flows that often increase the reliability of downstream water rights. The reliability of water rights that rely on reservoir storage is also based on assumed sedimentation rates that are projected through the planning period. While this assumption is good for planning purposes, it may not reflect current sedimentation rates. The models also contain assumptions in the internal modeling routines that affect the accuracy of results. Currently, the models are also not able to simulate the interaction between groundwater and surface water supplies.

3.3.3 Surface Water Drought Susceptibility

Within this report, the surface water reservoir and ROR supplies represent firm yield and reliable quantities, respectively. However, surface water is dependent on rainfall, and future droughts cannot be expected to follow the same pattern as the DOR used in the WAM. Therefore, the river authorities and water providers in Region H maintain Drought Contingency Plans prepared under provision of the *Texas Administrative Code, Section 30, Chapter 288* for their respective shares of these supplies. These drought plans are highlighted in *Table 3-7* and tabulated in detail in *Appendix 3D*. While each water provider utilizes unique criteria to define drought stages, their drought contingency plans use a common methodology. A first-stage trigger is used to initiate customer notification systems and voluntary use reductions. A second-stage trigger is used to initiate mandatory use reductions. Finally, a third-stage trigger is used to initiate additional use reductions and/or the suspension of service to some customers.

Table 3-7

Typical Drought Triggers for Region H Supplies

Water Source/ Established By	Drought Type	Trigger Condition and Duration
Lake Livingston – Wallisville System/TRA	Mild	Lake Livingston elevation is <126.50 feet at USGS gage, condition lasts 1 day
	Moderate	Lake Livingston elevation is <124.00 feet at USGS gage, condition lasts 1 day
	Severe	Lake Livingston elevation is <121.40 feet at USGS gage, condition lasts 1 day
Lake Conroe/SJRA	Mild	Elevation <198 feet (85% of storage capacity), condition lasts 1 day
	Moderate	Elevation <190 feet (55% of storage capacity), condition lasts 1 day
	Severe	Elevation<185 feet (40% of storage capacity), condition lasts one day
Houston System Reservoirs/ City of Houston	Mild	Combined storage (Lakes Livingston and Houston) is less than 24 months surface water supply, condition lasts 10 consecutive days
	Serious	Combined storage (Lakes Livingston and Houston) is less than 18 months surface water supply, condition lasts 10 consecutive days
	Severe	Combined storage (Lakes Livingston and Houston) is less than 12 months surface water supply, condition lasts 10 consecutive days
Brazos River at Richmond/GCWA	Mild	12.19 feet or 1700 cfs, condition lasts 1 day
	Moderate	11.93 feet or 1500 cfs, condition lasts 1 day
	Watch	11.65 feet or 1300 cfs, condition lasts 1 day
	Warning	11.23 feet or 1000 cfs, condition lasts 1 day
BRA System Reservoirs/BRA	Watch	For a reservoir/reservoir system, when storage is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months. For the entire Authority system, when the combined storage of the Authority system is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months.
	Warning	For a reservoir/reservoir system, when storage is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months. For the entire Authority system, when the combined storage of the Authority system is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months.
	Emergency	For a reservoir/reservoir system, when storage is < Stage 3 Trigger level. For the entire Authority system, when the combined storage of the Authority system is < Stage 3 Trigger level.

3.3.4 Surface Water Conveyance Systems

Region H contains a number of raw surface water conveyance systems (pipelines, canals, and pump stations). The conveyance systems lie primarily in the coastal river basins in the southern counties of Region H. The main canal systems belong to the COH, CWA, Gulf Coast Water Authority (GCWA), TRA, Lower Neches Valley Authority (LNVA), Chocolate Bayou Water Company (now part of the GCWA), SJRA, CLCND, and Dow Chemical. The information in this section was gathered from each of the entities listed above and the Trans-Texas Water Program Phase I Report for the Southeast Area. These systems are shown in *Figure 3-9*.

The CWA network consists of a main conveyance canal system and a pipeline distribution system. The conveyance system includes the Trinity River pump station, the main canal, the Lynchburg Reservoir, the Cedar Point lateral, the Lake Houston pump station, and the west canal. The Trinity River pump station near Liberty has been expanded to the ultimate design capacity of 1,400 mgd. The main canal runs westerly from the Trinity River pump station about 22 miles to the Lynchburg Reservoir (north of the Houston Ship Channel). The total capacity of the canal is approximately 1,300 mgd from the Trinity River Pump Station to the Cedar Point lateral. Downstream of the Cedar Point lateral, the canal has a capacity of 1,100 mgd. The Lynchburg Reservoir has an impoundment capacity of 4,600 acre-feet. The Cedar Point lateral, with a design capacity of 230 mgd, is located about 8 miles southwest of the Trinity River pump station and diverts water from the main canal southward. The Lake Houston pump station diverts water from Lake Houston into the CWA west canal, which travels southwesterly until it terminates at the COH East Water Purification Plant. The CWA distribution system consists of pressure pipelines that start at the Lynchburg Reservoir with the Lynchburg pump station and extend southwest about 10 miles to the Bayport Industrial Complex and eastward along State Highway (SH) 225 conveying raw water to industrial users and to the Southeast Water Purification Plant (SEWPP).

The GCWA system consists of three main canals that deliver water from the Brazos River to Fort Bend, Brazoria, and Galveston Counties: the American Canal, the Briscoe Canal, and the Galveston Canal System. The American Canal runs parallel to SH 6 southeasterly from the Brazos River lift station (the Shannon Plant, which is 12 miles north of Rosenberg) to Alvin, Texas. The Briscoe Canal runs southeasterly from the Brazos River pump station (the Briscoe Plant, which is 6 miles west of Arcola) to Alvin and then to an industrial complex in southern Brazoria County. The American Canal is connected to the Briscoe Canal by "Lateral 10" just west of Manvel. The Galveston Canal System extends from the old Briscoe system southeast of Alvin to the GCWA Reservoir (four miles east of Dickinson). The Galveston Canal System connects to the American Canal six miles east of Alvin. The Gulf Coast Water Authority has three pump stations: the Shannon Plant with a total capacity of 347 mgd, the Briscoe Plant with a total capacity of 302.4 mgd, and the American Canal's second lift station located in Sugar Land with a total capacity of 225 mgd.

The GCWA has recently purchased water rights formerly held by the Chocolate Bayou Water Company. The former Chocolate Bayou Water Company distribution system is divided into two sections. The Juliff section, also known as the old South Texas Water system, transports water from the Juliff pump station on the Brazos River near the Fort Bend-Brazoria County border, and the Chocolate Bayou Canal section, which transports water from Chocolate Bayou near Liverpool. The Juliff section has two main canals (the North Canal and the Main Canal) and the Angleton Lateral. This section provides irrigation water to rice farmers and some industrial water to Brazoria County. The Chocolate Bayou Canal section has its main pump station on Chocolate Bayou, but there are additional pump stations on Mustang Bayou and Halls Bayou as well. This section also provides irrigation and industrial water to Brazoria County.

The Dayton Canal is a small system that serves Liberty County. The canal, which diverts from the Trinity River, extends about 20 miles west of the river and has an estimated capacity of 90 mgd.

The Devers Canal System currently delivers irrigation water easterly from the Trinity River to customers in Liberty and Chambers Counties. The main canal system is 81 miles with 125 miles of laterals. Due to the flat grade of the main canal, the flow can be reversed to flow westerly. The system contains two pump stations. The first one on the Devers main canal at the Trinity River has a total rated capacity of 295 mgd, and the second pump station (near SH 563) has a total capacity of 274 mgd. The Devers system has recently been acquired by the Lower Neches Valley Authority (LNVA).

The LNVA system diverts water from the Neches River and Pine Island Bayou and delivers it to customers in Jefferson County, farmers in Chambers and Liberty Counties, and to the Bolivar SUD in Galveston County. The LNVA canal consists of two main canals, the Neches Main and the BI Main. After the junction of the two main canals, the Neches Main travels southwesterly until the Nolte Canal branches off traveling westward into Liberty County. At this point the Neches Main turns and extends southward into Chambers County. The Nolte Canal and the end of the Neches Main are the only sections of the LNVA canal system that extend into Region H. The Nolte Canal is divided into two portions by a check structure. The capacity of the Nolte Canal upstream of the check is 130 mgd and 36 mgd downstream from the check structure.

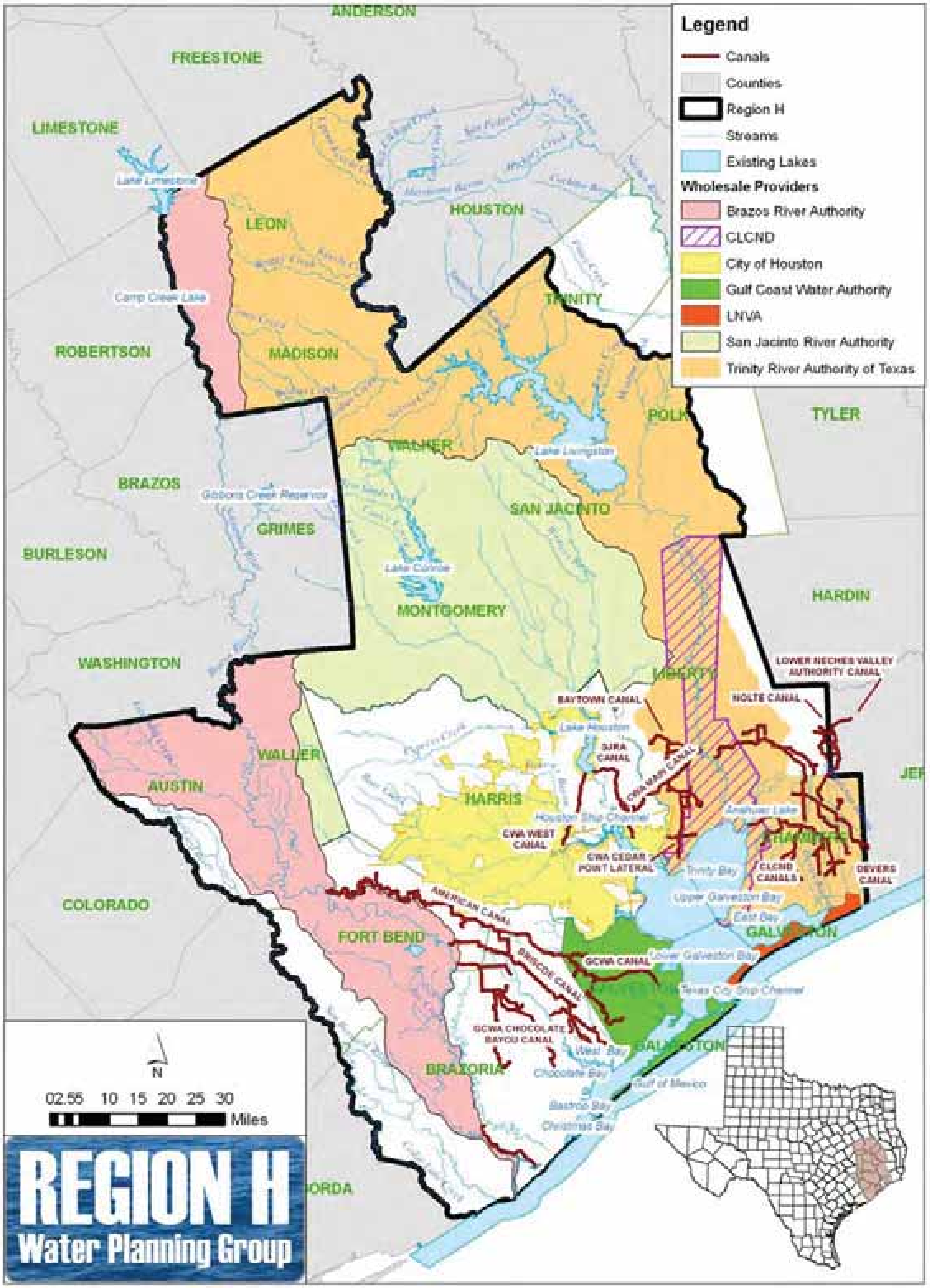
SJRA provides raw surface water from a point at the Lake Houston dam through its canal system and SJRA's Highlands Reservoir to a point just north of the Houston Ship Channel, providing service to the industrial customers in eastern Harris County. SJRA also contracts with the Coastal Water Authority (CWA) to convey up to 50 MGD of its Trinity Basin water supplies through the CWA Main Canal, and from there to their Highlands System.

The CLCND canal system diverts water from the Trinity River just south of Lake Anahuac. The canal travels easterly and branches to the north and south along the length of the main canal to serve the City of Anahuac and irrigators in Chambers County.

The Dow Chemical Company diverts water from the Brazos River into the Harris and Brazoria Reservoirs in Brazoria County. From Harris Reservoir, water is released into Oyster Creek and rediverted into a canal near Lake Jackson. From the Brazoria Reservoir, water is released into Buffalo Camp Bayou, which joins the Dow canal below the Oyster Creek diversion pump station. The canal travels parallel to the Brazos River and supplies the Brazosport Area Water Authority's water treatment plant before entering the Dow complex just north of Freeport. The canal continues east around Freeport to serve the Dow southern facility.

Figure 3-9

Raw Surface Water Conveyance Systems



3.3.5 Previously Studied Potential Reservoir Sites

In the City and Basin Master Plans within Region H, twenty-four potential reservoir sites have been identified. Of these, five have been identified in the State and Regional Water Plans as reservoir sites of unique value—Allens Creek in the Brazos Basin, Austin County; Little River and Little River Off-Channel in the Brazos Basin, Milam County; Bedias in the Trinity Basin, Madison County; and Tehuacana in the Trinity Basin, Freestone County. Construction of the Allens Creek reservoir and the Little River Off-Channel reservoir was recommended in the 2006 Region H Water Plan. From information provided in existing studies and reports, a summary table listing expected yields, costs, and a brief discussion of potential issues of concern regarding each potential reservoir is included in *Appendix 3E*.

The potential reservoir sites for Region H were reassessed as potential water management strategies for this update to the water plan. That discussion is presented in *Chapter 4*. Also, the sites were again considered for recommendation as reservoir sites of unique value. That discussion is presented in *Chapter 8*.

3.3.6 Legal and Regulatory Factors

A number of legal (institutional) and regulatory factors affect water planning, development, and usage within the Region H area. The most notable of these factors are surface water rights, groundwater conservation districts, interbasin transfer rules, wastewater return flow impacts, and environmental flow requirements.

All of the water included in the analysis of surface water supplies for Region H is obtained under water rights issued through the TCEQ and its predecessor agencies. The larger wholesale water providers hold a substantial portion of the rights available to the region, and these large providers contract to supply water obtained under those rights to various WUGs.

Five groundwater conservation districts exist within the Region H area. These districts are the HGSD, FBSD, Bluebonnet Groundwater Conservation District (includes Austin, Walker, and Waller Counties), Lone Star Groundwater Conservation District (Montgomery County) and Mid-East Texas Groundwater Conservation District (includes Leon and Madison Counties). Each district enacts and enforces groundwater regulations within their respective counties. The specific rules regulating the use of groundwater use were described in the previous section, *Subsidence Effects*. The Harris-Galveston and Fort Bend districts have adopted regulatory plans that limit the withdrawal of groundwater within their respective counties.

The Brown-Lewis Bill (formally Senate Bill 1, 75th Legislature) included restrictions on the interbasin transfer of water. These rules mandate that water supplies obtained by a receiving basin become junior to all other rights in existence within the originating basin of the transfer. This rule applies to all future permits associated with interbasin transfers. As illustrated within this report, a significant quantity of water currently supplied within Region H occurs via interbasin transfers. A portion of the water delivered by all of the larger water providers occurs through some type of interbasin transfer. The most significant of these are the COH and SJRA transfers of Trinity River water into the San Jacinto watershed and the BRA and GCWA transfers of Brazos River water into the San Jacinto-Brazos Coastal Basin. It is anticipated that new interbasin transfers will be needed to support growth throughout Region H, particularly to the San Jacinto and San Jacinto-Brazos Basins where the largest population growth is occurring. Current limitations on interbasin transfers will affect the development of future water resource management strategies.

In the 77th Texas Legislature, the Water Code was amended to remove an obstacle to long-term planning. Under the previous law, any water right that was unused for a period of ten years could be cancelled by the TCEQ, making that water available for diversion under other water rights permits. This is contrary to the state and regional water planning processes, which project demands 50 years in advance and recommend projects to meet demands 30 years in advance. The amendment to the Water Code exempts certain water rights from cancellation for non-use, including permits obtained as a result of the construction of a reservoir in whole or in part by the permit holder, permits for reservoirs of 50,000 acre-feet or larger, and permits obtained to meet demonstrated long-term water supply or electric generation needs.

Wastewater reuse and reclamation is a water management strategy that is growing in usage within the Texas water industry. Wastewater reuse is the reuse of wastewater prior to its discharge into a receiving stream of the state. These reused quantities can become supply for irrigation, manufacturing, mining, steam-electric power and limited municipal purposes (landscaping, etc.). Wastewater reclamation, however, can affect the reliability of existing surface water rights. In particular, within Region H, one of the greatest potential areas of reuse is within Harris and Montgomery Counties upstream of Lake Houston. Reuse within Region C in the Trinity Basin would impact the yield of Lake Livingston. Thus significant reuse of these flows may affect the water rights of SJRA, TRA, and COH. Indirect reuse permits are increasingly being requested within the state, allowing the use of the bed and banks of the receiving stream to carry treated effluent to a downstream diversion point. Unlike direct reuse, this practice is considered a separate diversion and requires a separate water right permit. These permits typically allow the rediversion of a percentage of the discharged volume, with the difference being allocated to meet carriage losses and instream flow requirements. The amount required to be left instream is determined on a site-specific basis by TCEQ.

3.3.7 Environmental Uses and Requirements

Water right permits for environmental use and enhancement may be granted by TCEQ, although there is no use category within the Water Code for meeting environmental needs. These water rights are typically categorized as Recreational or Other. Within Region H, there are fewer than 20 permits for the diversion or impoundment of water for the purposes of wetland habitat creation/maintenance, wetland mitigation, or wildlife conservation. The larger of these permits are listed in *Table 3-8*. Since 1985, environmental flow requirements have been included as conditions within new and amended water rights. These requirements may include a specified minimum instream flow or gauge height threshold for diversions under the permit, or specify a percentage of the diverted amount that must be returned to the source stream. The establishment of these permit conditions requires supporting data on environmental needs of rivers, streams, bays, and estuaries for wetlands habitat. To increase this body of knowledge, the Texas Instream Flow Program was initiated in 2003 as a joint effort between TPWD, TCEQ, and TWDB. A series of studies are funded and underway, and the results will be incorporated in future water rights permitting and regional water planning.

In 2007, Senate Bill 3 took effect beginning the environmental flows allocation process. The process began with the creation of the Environmental Flows Advisory Group and the Texas Environmental Flows Science Advisory Committee to guide the statewide process. Two basin and bay area stakeholder groups have been formed to develop recommendations concerning environmental flow regime, associated policy considerations, and strategies to meet the flow recommendations that will impact environmental flows in Region H. The Trinity and San Jacinto Rivers and Galveston Bay Stakeholders Committee was appointed in July of 2008. The TCEQ is expected to adopt environmental flow standards for the Trinity and San Jacinto Rivers/Galveston Bay by June 1, 2011. The Stakeholder group for the Brazos River/Bay and Estuary Area will be appointed by June 1, 2010 and begin working on recommendations concerning environmental flow regime, associated policy considerations, and strategies to meet the flow recommendations. The TCEQ is expected to approve the group’s recommended environmental flow standards by April 1, 2013.

Table 3-8

Major Environmental Water Rights in Region H

Owner	Stream	Use	Diversion (acre-feet/year)
U.S. Anahuac Wildlife Refuge	Oyster Bayou	Anahuac NWR* – wetland habitat	21,000
Texas Parks & Wildlife Department	Carpenters Bayou	Sheldon WMA** – wetland habitat	2,688
U.S. Fish and Wildlife Service	Bastrop Bayou Austin Bayou	Brazoria NWR – fish & wildlife conservation	2,527
U.S. Fish and Wildlife Service	Cedar Lake Creek	San Bernard NWR – wetland habitat	1,086
U.S. Fish and Wildlife Service	Big Slough	Brazoria NWR – fish & wildlife conservation	1,080

*NWR is National Wildlife Refuge
**WMA is Wildlife Management Area

A new provision under the Texas Water Code establishes the Texas Water Trust within the Texas Water Bank. Existing water rights can be placed in the Texas Water Trust to be dedicated to environmental needs, including instream flows, water quality, fish and wildlife habitat, or bay and estuary inflows. While no water rights from Region H have yet been placed in the Texas Water Trust, it can be anticipated that it will figure in further efforts to address both the technical and institutional issues associated with environmental water rights within Region H.

3.3.7.1 Bay and Estuary Inflows

Estuaries are coastal waters where inflowing stream or river water mixes with and measurably dilutes sea water. The Brazos River has a very small estuary, but Galveston Bay is one of the largest and richest estuary systems in the state. Tides along the Region H portion of the Texas Gulf Coast are small (typical ranging up to 2 feet), but their influence is felt far inland due to the flat topography of the coastal plain. Galveston Bay averages a 7-foot tidal depth, so freshwater inflows are important in balancing the tidal intrusion of seawater into the estuary habitat.

The Region H Water Planning Group requested input from the Galveston Bay Freshwater Inflow Group (GBFIG) to address this resource need. GBFIG was established in December 1996 as an ad hoc technical work group. GBFIG includes representatives of major stakeholders in the use of Galveston Bay and its tributaries including all those groups specifically itemized in Sec. 11.1491 of the Texas Water Code for "estuary advisory councils." Its efforts have been endorsed, and staff participation has been authorized by TWDB, TCEQ, TPWD, and the General Land Office (GLO). GBFIG coordinates with and reports its findings to both the Galveston Bay Estuary Program and RHWPG.

The work of GBFIG builds upon the State Bay and Estuary Studies authorized by the Legislature in 1985 (HB-2) and amended in 1987 (SB-683). On December 31, 1994, *Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determination of Needs* was published jointly by TWDB and TPWD. This document details the methodology to be applied in each of seven major estuarine systems. Several draft documents providing historical inflow data (1941-1990) and application of the State's methodology to Galveston Bay followed. In December 1998, TPWD issued a final *Freshwater Inflow Recommendation by Texas Parks and Wildlife Department for the Trinity-San Jacinto Estuary* (hereafter cited as TPWD 1998).

TPWD 1998 presented output from the State's optimization model relating freshwater inflows to biological productivity. Based on that analysis of monthly inflow data, several points on a performance curve were identified, ranging from Max Q, the maximum quantity of freshwater falling within the range of analysis, to Min Q, the minimum modeled quantity of freshwater inflow capable of maintaining bay and estuary fishery harvest. The Galveston Bay system receives average annual inflows of about 10 million acre-feet per year (maf/yr), and median twelve-month inflows of just over 7 maf/yr. Because of the uncertainties inherent in analyzing or managing natural processes, TPWD recommended the point of "maximum harvest" (Max H), or a flow of 5.2 maf/yr, as the target inflow for the Galveston Bay system.

Using the data developed by the State, special studies of Galveston Bay freshwater inflows have been performed in conjunction with regional water planning efforts. In April 1998, Brown & Root completed a *Galveston Bay Freshwater Inflow Study* under the Trans-Texas Water Program. Additional modeling by Brown & Root has been performed to address specific analytic needs of GBFIG. The TCEQ WAM program has improved the statistical data and model availability for Galveston Bay. The Region H Planning Group requested more thorough studies of freshwater inflows and impacts of strategies. The 2006 RWP included a study by Kellogg, Brown & Root on the impacts of water management strategies on seasonal frequency. This evolved into a special study in the first phase of the 2011 planning process by AECOM to determine impacts of individual strategies at a frequency greater than the annual frequency previously studied. An additional study, contained in the *Chapter 4* of this Plan, examines impacts of management strategies in conjunction with upstream strategies for each decade of the planning horizon.

Based on information from state and regional studies, GBFIG set about relating its consideration of freshwater inflow needs to the planning task of Region H. GBFIG developed a recommendation that relates target flows under a range of conditions to target frequencies as shown in *Table 3-9*, which generally are less frequent than historical frequency of occurrence. GBFIG specifically noted that development of management strategies for freshwater inflows requires the consideration of quantity, quality, seasonality (monthly flows), and location of inflows and that its own analytic efforts would continue. It also noted that flows available to meet environmental water needs included total flows to the system and, as a result, include some sources outside of Region H. The GBFIG recommendation was accepted for incorporation into the Regional Water Plan in March 2000.

Table 3-9

Environmental Water Needs for Galveston Bay

Inflow Scenario	Quantity Needed (million acre-feet/year)	Historical Frequency	Target Minimum Frequency
Max H	5.2	66%	50%
Min Q	4.2	70%	60%
Min Q-Sal	2.5	82%	75%
Min Historic	1.8	98%	90%

Scenario Descriptions:
Max H: Modeled inflows recommended for maximum bay and estuary fisheries harvest by TPWD.
Min Q: Minimum modeled inflow recommended to maintain the bay and estuary fisheries harvest.
Min Q-Sal: Estimated minimum acceptable inflow recommended to maintain the salinity needed for bay and estuary fisheries viability.
Min Historic: Minimum annual inflow calculated for Galveston Bay over the period of record (1941-1990).

Notes: The health and productivity of Galveston Bay must consider the quantity, quality, seasonality (monthly inflows), and location of inflows. It is anticipated that the inflow needs projections will continue to be refined over time. The use of improved data focusing on the fisheries production solely from the Galveston Bay system is one example of an anticipated means of refinement.

3.3.7.2 Water Quality

The Texas Commission on Environmental Quality (TCEQ) *2008 State of Texas Water Quality Inventory Report* addresses the streams within all Texas river basins by segment. Each segment is described and classified, the designated water uses are identified, and the water quality is determined. This report was reviewed for the river segments in Region H to identify their uses and any existing conditions or concerns. Region H is fortunate not to have naturally occurring chlorides or minerals affecting surface water quality as is the case in some regions, but the effects of development within the watersheds are reflected in the Inventory Report. Some streams and bayous, predominantly in the lower San Jacinto Basin and the San Jacinto-Brazos Coastal Basin, were found to be non-supportive of contact recreation due to elevated bacterial levels. This condition is typically the result of wastewater discharges and urban watershed runoff. Sand mining in the San Jacinto River Basin has increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels. Basin maps from the *Water Quality Inventory Report* are shown in *Appendix 3F*. A search of the TCEQ Water Rights Database revealed three water rights specifically designated for the improvement of instream water quality (see *Table 3-10*). The largest of these is used for stream quality control in Brazoria County.

Table 3-10

Water Quality Rights in Region H

Owner	Stream	Use	Diversion (acre-feet/year)
Dow Chemical Co.	Brazos River	Stream Quality Control	16,000
Paul Weinman	Brazos River	Wetlands	2,448
Cove Creek Corp.	Cove Creek	Water Quality – Flush sewage effluent	967

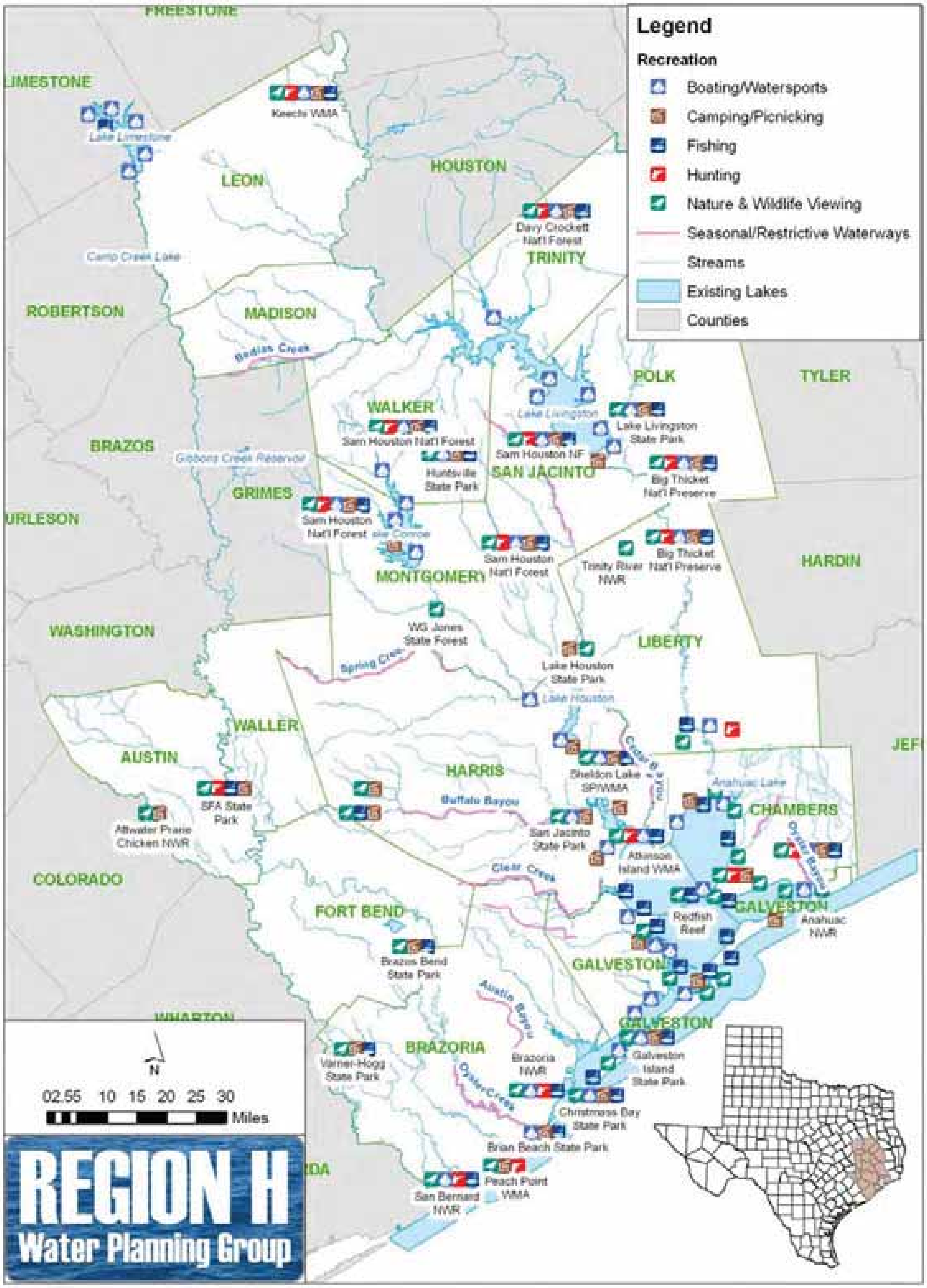
As with the Galveston Bay estuary, instream salinity is a concern in the flat lower reaches of the Trinity, San Jacinto, and Brazos Rivers. The tidal salt wedge migrates upstream during the drier summer months, threatening the intakes of water right holders. This situation has been addressed on the Trinity River by the construction of the Wallisville Saltwater Barrier, and the Lake Houston dam protects the intake points for the COH and SJRA. The effects of the salt wedge on Brazos River water rights are discussed in *Chapter 4* of this report. *Figure 3-10* depicts the seasonal and restrictive waterways of Region H.

The Texas Parks & Wildlife Department conducted an *Analysis of Texas Waterways: A Report on the Physical Characteristics on Rivers, Streams, and Bayous in Texas*. This 1996 report identifies the seasonal and restrictive waterways:

“those sections of rivers, streams, and bayous… which have been found to contain an insufficient flow of water for recreational use under normal conditions, or for various reasons could not be classified as a major waterway, and would be restricted to seasonal usage”

Figure 3-10

Seasonal and Restrictive Waterways in Region H



3.3.7.3 Unique River and Stream Segments

The Region H Water Planning Group identified eight stream segments of unique ecological value in the 2006 Region H Water Plan. These are Armand Bayou in Harris County; Austin Bayou, Bastrop Bayou and Cedar Lake Creek in Brazoria County; Big Creek in Fort Bend County; another Big Creek in San Jacinto County; Menard Creek in Liberty, Hardin, and Polk Counties and Oyster Creek in Chambers County. Several of these streams are used for irrigation and/or recreational supplies, but these water rights were not included in the total Region H supply due to size or reliability. A full discussion of unique stream segments is made in *Chapter 8*.

3.3.8 Navigational Uses

The Texas Natural Resources Code states that if a water body maintains an average width of 30 feet, it is considered navigable. The Texas Department of Transportation, the U.S. Army Corps of Engineers, and several port authorities share responsibility for maintaining the major navigable waterways within the region. These include the Gulf Intracoastal Waterway, the Houston Ship Channel, and the Lower Trinity River.

The Gulf Intracoastal Waterway is a man-made canal paralleling the Gulf Coast. In Texas, it is 433 miles long, and within Region H it crosses Chambers, Galveston, and Brazoria Counties, serving the Ports of Galveston and Freeport. The system is over 50-years old and the U.S. Army Corps of Engineers maintains the canals through a program of scheduled dredging. The flow in the waterway is brackish and not used for water supply.

The Houston Ship Channel is a deep-draft channel connecting ocean-going vessels with the Port of Houston and industries located along Buffalo Bayou. It begins at the mouth of Galveston Bay and continues north past the Barbours Cut Terminal and Bayport Industrial Complex, into the San Jacinto River and Buffalo Bayou, ending at the Port of Houston Turning Basin. Ship channels serving the Port of Galveston and the Port of Texas City branch off from the main channel on the northwestern side of Galveston Island, and the system connects with the Gulf Intracoastal Waterway at that point as well. The respective port authorities and the U.S. Army Corps of Engineers maintain the ship channels at a depth of 45 feet to serve deep-draft vessels. Although the entire length of the Ship Channel is tidally influenced, there is some concern that the deep dredging may influence the salinity of the shallow Galveston Bay estuary, which averages 7 feet deep, particularly during drought periods.

The Lower Trinity River serves the shallow (6-foot draft) cargo Port of Liberty, Texas. Water depth and freshwater quality is maintained in the Lower Trinity River by the Wallisville Saltwater Barrier, which includes a lock system for navigation. Barge traffic connects from the Port of Liberty to the Intracoastal Waterway by traversing a dredged canal along the eastern coast of Trinity Bay. This canal connects to the Houston Ship Channel west of Smith Point.

Numerous recreational ports serve the region. The Texas Department of Transportation recognizes the Port of Anahuac on the Trinity Bay and the Port of Sweeny on the San Bernard River, although there are many others. These ports are located in tidal areas, and do not require freshwater flows to maintain navigability.

3.3.9 Recreational Uses

Water-based recreational uses in Region H include activities that are directly dependent upon the region's rivers, streams, reservoirs, and bays, such as swimming, boating, fishing, and paddle sports, as well as those enhanced by proximity to water sources such as wildlife viewing, camping and hunting, and eco-tourism. There are also economic activities associated with water-based recreation such as marinas, tourist accommodation and services, and other recreation-based businesses. Generally, communities developed adjacent to or near accessible water bodies contribute to an increased tax base from which economic benefits can accrue. Positive local tax base impacts in rural communities of Region H have been and can be significant. Therefore, reservoir development in these areas has been viewed as an economic benefit for these regions. Recreational water needs and requirements have two distinct components – physical and economic.

The physical component addresses the amount (volume) of water needed to perform various recreational activities. This is strictly a function of the geometry of whatever body of water is being considered and the type of activity that is being investigated.

In order to provide for this need, some stakeholders in water-related recreational activities apply for permits from TCEQ that allow them to divert and impound water in man-made lakes and ponds dedicated to recreational purposes. A search of the TCEQ Water Rights Database returned 160 records for recreation water rights with total diversion of about 9,200 acre-feet per year. Five of these rights account for 6,572 acre-feet per year in authorized diversions as shown in *Table 3-11*.

Table 3-11

Major Recreational Water Rights in Region H

Owner	**Stream**	**Diversion (acre-feet/year)**
Brazos River Club	Brazos River	3,000
Indigo Lake Estates	Log Gully	1,164
C E Zwahr ET AL	Austin Bayou	1,003
George W Maxwell	Cow Island	805
The Woodlands Corporation	Bear Branch	600

The majority of the region's freshwater recreation occurs not on dedicated recreational lakes, but on water supply reservoirs. The region's water supply reservoirs provide a broad range of recreational opportunities but were created to meet the region's consumptive water demands. While recreation is permitted on most of the region's water supply reservoirs, there are no dedicated recreational water rights protecting volumes for recreational purposes on these reservoirs. Three water supply reservoirs in Region H provide a significant portion of the freshwater-related recreational activities in the region—Lake Livingston, Lake Conroe, and Lake Houston, in decreasing degrees.

The economic importance of water-based recreational businesses is illustrated in recent studies that indicate water-related recreational activities account for a significant portion of the Texas economy. In 2006, Texas residents and non residents spent $9.2 Billion on wildlife recreation in Texas. Approximately $4.7 Billion was spent on equipment, $2.9 Billion on trip expenditures and $1.6 Billion was spent on licenses, contributions, land ownership/leasing. The 2006 National Survey of Fishing, Hunting, and Wildlife – Associated Recreation reported that there were an estimated 2.5 million anglers in Texas (residents and non-residents), with total expenditures estimated at approximately $3.2 Billion. The survey also estimated that there were approximately 1.1 million hunters in Texas with expenditures of approximately $2.2 Billion. The Texas Parks & Wildlife Department reported in 2008 that approximately 595,000 boats (6^{th} nationally in boat ownership) are registered in the state, 99 percent of which are used as pleasure craft. Counties in Region H account for nearly one-quarter of these.

While there is a direct relationship between lake levels and these industries, there is no statistical data available to quantify that relationship. Although anecdotal information suggests negative impacts will accrue to lakeside communities when reservoir levels decrease, there is no economic data available which would allow a comparison to the economic impacts of not meeting municipal, manufacturing and/or irrigation water demands. When considering the impacts of lake levels, one might consider (1) water levels required to operate boat ramps and docks, (2) water levels or depths required to support water recreational activities (boating and fishing), and (3) water levels required to support resident and migratory wildlife. Also important to consider is the acceptable duration of a given condition. Lake levels will decline during droughts, but recover during average-to-wet years. Resident wildlife species will be directly affected by the drought conditions. Migratory species would be indirectly affected, because they would be able to adjust their routes to find the best habitats in a particular year.

All state parks and forests, national parks and forests, wildlife refuges, and wildlife management facilities were identified in order to consolidate a listing of recreational resources in Region H. Every facility was researched to determine if it provided facilities for camping and picnicking, nature and wildlife viewing, hunting, fishing, and boating and other water sports. Sources include various websites and publications from the Texas Parks & Wildlife Department, National Park Service, USDA Forest Service, U.S. Fish and Wildlife Service, National Wildlife Refuge System, Galveston Bay National Estuary Program, U.S. Army Corps of Engineers, U.S. Historical Society, Great Outdoor Recreation Pages, Recreation.Gov, *1998-1999 Texas Almanac*, Texas road atlases, and various county and river authority websites. Additional information was acquired from the Houston Canoe Club on areas within the region of importance to paddle sports. This information was compiled into the following three tables contained in *Appendix 3G*.

Region H-River Segments, Bay and Estuaries – Lists all of the river basins, river segments, bays, and estuaries in the region and the recreational opportunities associated with each.

Recreation – Lists all of the national parks, preserves, wildlife refuges, state parks, wildlife management areas, and forests and the recreational opportunities associated with each.

Region H-River Segments, Bay and Estuaries-Special Features – Lists all of the lakes and reservoir segments in the region and the recreational opportunities associated with each.

From the tables containing the public recreational sites and data obtained from the *Galveston Bay Recreational User's Handbook*, *Figure 3-10* was prepared to illustrate the location and each associated recreational activity for Region H. This map also shows the seasonal and restricted waterways within the region. *Appendix 1A* contains a detailed bibliography of all of the sources used for this section.

3.4 Total Water Supply

The total amount of water supply currently available to Region H from existing available water sources is 3,556,538 acre-feet per year. Of that, approximately 75 percent is surface water. By the years 2030 and 2060, the available supply is expected to be 3,343,151 acre-feet per year and 3,411,210 acre-feet per year, respectively. *Table 3-12* below summarizes current and projected water supplies.

3.4.1 Water Supplies Available by City and Category

This water supply is distributed to each WUG, i.e. each city, each county-other, and each non-municipal water use category. This distribution is shown in *Table 3H.1*, located in *Appendix 3H*.

In *Table 3H.1*, the ground and surface water supply sources available to Region H are assigned to the various WUGs in the region based on contracts and water rights, limitations of conveyance facilities, and in some cases, current usage patterns. In general, a thorough search was performed to determine how each WUG obtained its water supply. This required identification of third-party contracts as well as water providers in addition to the wholesale water providers (WWPs).

About 72 percent of the year 2010 total available Region H supply is allocated to the region through one of the WWPs. *Table 3-13* shows the distribution of the available supply among the providers for the study years of 2010, 2030, and 2060.

Table 3-12

Summary of Water Supply Available for Region H for Study Years 2010, 2030, and 2060

Supply Source	**Supply Available (acre-feet/year)**		
	Year 2010	**Year 2030**	**Year 2060**
Groundwater			
Gulf Coast Aquifer	812,709	685,529	685,843
Carrizo-Wilcox Aquifer	10,493	9,756	9,610
Queen City Aquifer	7,906	7,906	7,906
Sparta Aquifer	17,414	17,414	17,414
Brazos River Alluvium	41,539	41,539	41,539
Yegua-Jackson Aquifer	6,400	6,400	6,400
Undifferentiated Aquifer	1,117	1,117	1,117
Subtotal	**897,578**	**769,661**	**769,829**
Surface Water			
Neches River Basin[1]	63,863	63,946	64,177
Neches-Trinity Coastal Basin	21,754	21,754	21,754
Trinity River Basin	1,568,530	1,489,530	1,568,530
Trinity-San Jacinto Coastal Basin	34,313	34,313	34,313
San Jacinto River Basin	321,800	314,000	302,300
San Jacinto-Brazos Coastal Basin	33,051	33,051	33,051
Brazos River Basin[2]	573,081	573,278	573,342
Brazos-Colorado Coastal Basin	12,019	12,019	12,019
Local Supplies, all basins	30,549	31,599	31,895
Subtotal	2,658,960	2,573,490	2,641,381
Total	3,556,538	3,343,151	3,411,210

[1] Supplies include 63,863 acre-ft per year of firm water currently contracted from upstream LNVA to Region H customers. Total LNVA supply is greater but may not be available to Region H.

[2] Supplies include 155,031 acre-ft per year of firm water currently contracted from BRA system reservoirs to Region H customers. The total BRA supply is greater but is not available to Region H. The remaining Brazos River Basin supply is comprised of Lower Brazos Basin permits owned by Dow Chemical, GCWA, NRG, Brazosport Water Authority, and private irrigators.

Table 3-13

Available Supply by Wholesale Water Provider within Region H for Study Years 2010, 2030, and 2060

Provider	Supply (acre-feet/year)		
	Year 2010	**Year 2030**	**Year 2060**
Baytown Area Water Authority	17,534	17,534	17,534
Brazos River Authority*	155,031	155,031	155,031
Brazosport Water Authority	16,492	16,492	16,492
Chambers-Liberty Counties Navigation District	76,520	76,520	76,520
Central Harris County Regional Water Authority	5,651	3,662	3,662
Clear Lake City Water Authority	26,876	26,876	26,876
Dow Chemical[1]	137,475	137,475	137,475
Fort Bend County WCID 1	5,634	5,634	5,634
Fort Bend County WCID 2	8,654	7,387	7,375
Galveston County WCID 1	3,541	3,541	3,541
Gulf Coast Water Authority[2]	192,687	214,190	214,254
City of Houston	1,264,231	1,203,528	1,254,628
City of Huntsville	27,686	27,640	27,567
Lower Neches Valley Authority*	63,863	63,946	64,177
Missouri City	25,534	18,999	18,985
North Channel Water Authority	8,355	8,332	8,327
North Fort Bend County Water Authority	35,009	48,077	48,077
North Harris County Regional Water Authority	115,957	65,272	65,272
NRG[3]	94,220	94,220	94,220
Richmond - Rosenburg	14,908	11,779	11,779
City of Pasadena	40,561	40,561	40,561
San Jacinto River Authority	245,244	240,244	232,744
Trinity River Authority	403,200	379,500	403,200
City of Sugar Land	32,844	22,537	21,590
West Harris County Regional Water Authority	65,692	36,958	36,958
Total	**3,083,399**	**2,925,935**	**2,992,479**

*Supplies represent current contracts to Region H with the assumption that the contracts will be extended and maintained through 2060. Total supply is greater but may not be available to Region H.
[1] Dow Chemical supplies do not include 16,000 acre-feet per year contracted from BRA
[2] GCWA supplies do not include 44,980 acre-feet per year contracted from BRA.
[3] NRG supplies Include Richmond Irrigation water rights. NRG supplies do not include 83,000 acre-feet per year contracted from BRA.

3.4.2 General Methodology for Assigning Resources to WUGs

The following methodology summarizes the data collection process and the other procedures followed to arrive at the information in *Appendix 3H*. In general, the methodology includes the following steps.

Data Collection

- Identify contract supplies available to WUGs via a direct or multi-tier transaction with a WWP using contract information from WWPs and the 2006 Regional Water Plan.
- Coordinate with other planning regions to resolve interregional conflicts, where applicable. No interregional conflicts were identified during discussions with regions C, G, and I.
- Identify other possible water providers, using the TWDB Water Use Database and any other available information. Identify the end user WUGs that are supplied by these providers under a contractual or retail agreement. Contact these providers, and request contract information from them.
- Identify surface water supplies being used by self-supplied WUGs, by consulting the TCEQ Water Rights Database and *Table 3A.1*.
- Update information for water providers identified in the 2006 Regional Water Plan.

3.4.3 Groundwater Allocation

Groundwater supplies in Leon and Madison Counties were allocated according to information received from the Mid-East Texas Groundwater Conservation District. Groundwater supplies in Harris, Galveston, and Fort Bend Counties were allocated in accordance with the groundwater reduction goals provided by the Harris-Galveston Subsidence District (HGSD) and the Fort Bend Subsidence District (FBSD). In Brazoria County, groundwater supplies were allocated based on historic pumpage. In Liberty County, groundwater was first allocated to non-irrigation WUGs. The exceptions are described in more detail below. Generally, where groundwater resources were not adequate to meet demands, supplies were distributed to WUGs based on total demand. Any exceptions to this rule are noted below.

3.4.3.1 Counties With Adequate Groundwater Resources

The available groundwater supplies in Austin, Leon, Madison, Polk, San Jacinto, Trinity and Walker Counties were found to be adequate to satisfy the groundwater demands of WUGs for the planning period.

Water was allocated to WUGs in Leon and Madison Counties and was allocated with guidance provided by the Mid-East Texas Groundwater Conservation District. The plan set forth by the district shows the amount of water allocated from each source to individual customers including irrigation, livestock, manufacturing, and mining users. These values were adjusted, within reasonable limits, to minimize shortages.

3.4.3.2 Counties With Inadequate Groundwater Resources

Brazoria County

Brazoria County has municipal, manufacturing, mining, irrigation, and livestock water demands that cannot be entirely satisfied by surface water and groundwater resources. The groundwater availability of approximately 50,400 acre-feet per year can satisfy part of the water needs but not all of the needs in the county. The communities of Jones Creek, and West Columbia were allocated groundwater to meet their entire demands while others were supplied groundwater in addition to surface water supplies. Adequate groundwater was also budgeted through 2060 to supply the Brazoria County MUDs, Bailey's Prairie, Brookside Village, Danbury, Hillcrest, Holiday Lakes, Iowa Colony, Orbit Systems Inc., Southwest Utilities, Surfside Beach, Sweeny, and Varner Creek UD entirely from groundwater. After meeting the groundwater demands of these WUGs, the remaining groundwater supply was allocated among users that were connected to surface supplies as well as groundwater.

The City of Brazoria was capable of providing for all of its demands through 2060 by using surface water supplies and was not allocated any of the county's groundwater resources. Alvin, Angleton, Clute, Freeport, Oyster Creek, Manvel, Pearland and Richwood develop shortages in either 2020 or 2030. Supplies to irrigation in the Brazos River Basin are anticipated to be insufficient to meet demands beginning in 2010. Manufacturing shortages in the Brazos and San Jacinto-Brazos River Basins begin in 2010 and 2020, respectively. Livestock demands that were not met by this groundwater supply were assumed to be provided by local water supplies in 2010. Mining shortages are expected to occur in 2020.

Chambers County

Chambers County will experience groundwater shortages immediately in the 2010 planning period without the use of surface water supplies to meet its municipal, irrigation, manufacturing, mining, and livestock demands. Throughout all of the planning periods, the county will not be able to rely on groundwater supplies alone. Groundwater resources were distributed to each WUG receiving groundwater according to total demand.

Galveston and Harris Counties

Groundwater was allocated in Galveston and Harris Counties in accordance with regulations established by HGSD which provide for reductions in groundwater pumping in these counties based on a percent of total demand over the planning period. The groundwater reductions vary depending upon the Subsidence District area where the WUG is located.

WUGs located in Subsidence District Area 1 were limited to groundwater usage equal to 10 percent of their total demand for all planning periods from 2010 to 2030. For 2040 through 2060, the 2030 groundwater allocation was carried forward. In Area 2, WUG groundwater usage was limited to 20 percent of their total demand for the planning periods 2010 to 2030. For 2040 through 2060, the 2030 groundwater allocation was carried forward. Maximum groundwater usage for WUGs located in Area 3 varied by planning period. The maximum allowable groundwater use for 2010 was calculated to be 70 percent of the total water demand for the period, for each WUG. For 2020, this percentage was decreased to 30 percent. For 2030 and subsequent decades, only 20 percent of the total water demand could be met with groundwater sources. Steam Electric and Mining WUGs were first allocated surface water supplies followed by groundwater until the remaining demand was satisfied, or the regulatory limit was reached.

Shortages from insufficient supply begin in the San Jacinto River Basin of Harris County in 2010 due to groundwater restrictions. Before this time, shortages are due to groundwater restrictions. In the San Jacinto-Brazos and Trinity-San Jacinto Coastal Basins of the county, groundwater shortages through 2060 only occur due to groundwater pumping restrictions and not from limited supply. Municipal WUGs in Galveston County will experience shortages due to restrictions rather than limited supplies for all of the planning periods. In the Neches-Trinity Coastal Basin, only livestock and mining WUGs are served by groundwater, and these users will experience shortages due to groundwater restrictions.

In instances where groundwater supplies were not adequate to meet groundwater demands or restricted groundwater demands, the amount supplied was prorated among the WUGs based on restricted demand, or total demand, if no restrictions applied.

Fort Bend County

Similar to the subsidence restrictions imposed upon Harris and Galveston Counties by HGSD, the FBSD regulates the quantity of groundwater pumpage in portions of Fort Bend County. However, these restrictions only apply to two zones in the northeastern portion of the county. The FBSD regulations also do not align with the planning decades; surface water conversion dates in 2013 and 2025 require groundwater users in Fort Bend County to reduce groundwater pumpage to 70 percent and 40 percent of total demand respectively. For the 2010 planning period it was assumed that each WUG could pump groundwater in order to satisfy 100 percent of the total 2010 demand. For the 2020 planning decade it was assumed that both zones would be required to lower pumpage to 70 percent of the total demand for each WUG. For the 2030 period, it was assumed that only 40 percent of the total WUG demands could be met by groundwater. For the planning periods 2040 through 2060, the 2030 ground water supply volumes were carried forward. These limitations were not applied to irrigation usage within the county, which were allocated sufficient groundwater supplies in order to provide for irrigation demands remaining after surface water contracts were allocated. Steam Electric and Mining WUGs were first allocated surface water supplies, and then groundwater until the remaining demand was satisfied, or the regulatory limit was reached.

The groundwater restrictions imposed by FBSD are not sufficient to prevent shortages due to supply from 2010 to 2060. The available amount of groundwater was distributed to WUGs according to their demands or restricted demands, where applicable. It was assumed that all groundwater demands to irrigators could be met by groundwater after applying existing surface water contracts. The FBSD restrictions do not apply to irrigators and small domestic wells and it is assumed that these users would pump the amount of water necessary to meet their demands. Therefore, the total available groundwater supplies were increased to accommodate the additional water usage by irrigators, as well as other unregulated WUGs, such as Pleak, that were not subject to subsidence restrictions.

Liberty County

Irrigation demands in Liberty County are of considerable magnitude. For this reason, groundwater was first provided to nonirrigation WUGs. The remaining groundwater was allocated to irrigation based on demand. Shortages appear in the 2010 period for irrigation in the Neches, Neches-Trinity, and Trinity San Jacinto River Basins. However, surface water supplies are adequate to prevent irrigation in the Trinity River Basin from experiencing further shortages until 2020.

Montgomery County

Available groundwater supplies are projected to be inadequate to meet demands in Montgomery County beginning in the 2010 planning period. The Lonestar Groundwater Conservation District established conversion requirements to limit groundwater withdrawal in Montgomery County to 64,000 acre-feet per year. To meet initial conversion requirements in 2015 more populated communities, most notably Conroe and the Woodlands, will be over-converted to surface water while smaller communities will remain on groundwater. For conversions after 2015, 2045 projected water demands were used to determine the WUGS that would be converted to surface water. Groundwater was initially allocated proportionally to municipal WUG demands, first to WUGs that were not converted to surface water then to WUGs that were anticipated to be converted before each planning period. The WUGs Consumers Water Inc, Crystal Springs Water Company, Magnolia, Montgomery County UD 2 & 3, Montgomery County WCID #1, New Caney MUD, Patton Village, Point Aquarius MUD, Porter WSC, Roman Forest, Southwest Utilities, Splendora, Stagecoach and Woodbranch were assumed to remain on groundwater supplies from 2010 to 2060. The mining water demand remaining after including surface water contracts was fully met by groundwater supplies. Livestock demands were met entirely from local supplies and groundwater. The small irrigation demand in Montgomery County was supplied by surface water contracts from SJRA and groundwater supplies.

Waller County

The groundwater resources of Waller County were allocated for municipal, manufacturing, mining, irrigation, and livestock based on the groundwater available for the county. The estimated demands for groundwater within the county can be met with available groundwater supplies, Municipal and irrigation conservation and groundwater supplies from Harris County. Katy, which receives groundwater from Harris County, is assumed to remain on groundwater due to participation in the West Harris County Regional Water Authority groundwater reduction plan.

3.4.4 Surface Water Allocation

- The values entered into *Appendix 3H* for municipal WUGs are the surface water supply identified from WWPs and smaller water providers.

- It was assumed that the COH provided enough water to meet its remaining surface water demands and existing contracts for surface and groundwater.

- Contracts from GCWA were found to exceed the total of the WWP's contracts from other providers and water rights. Because of this, existing GCWA contracts and supplies were analyzed on a monthly basis and annual allocations were lowered accordingly.

- As a general rule, if a WUG is found in different counties, the supply allocated to the WUG in each county was split based on the surface water demand. In cases where this demand was "0," the supply was split equally between these counties. (The surface water demand for each entry WUG/county/basin was calculated by subtracting the allocated groundwater for that entry from that entity's total demand).

- Municipal contracts that were not identified as a municipal WUG were assumed to be a portion of County-Other and assigned to the appropriate county and basin unit.

- For non-municipal WUGs, contracts from water providers were used to determine contractual sources to various categories. Wherever possible, each contract was associated with a basin through available information.

- For non-municipal WUGs, some information was received from water rights information collected in the previous steps and entered in *Table 3A.1* on a WUG/county/basin basis. Ownership and use information for the available firm supplies was provided by the TCEQ Water Rights Database.

- Irrigation entries were compiled from contracts and firm water rights described later in this chapter.

- Livestock entries assumed livestock demands would be provided from local surface water supply sources. This is consistent with past Regional Water Planning procedures.

- In the 2006 Plan, mining WUGs with shortages in the year 2000 were assumed to be supplied from local surface supplies equal to their shortage. This amount was also carried out for the remaining planning periods. The 2011 Plan will adopt the amount identified in the 2006 Plan.

Data Collection

Entities that sell water to WUGs in the region were contacted in order to obtain an up-to-date list of their water commitments. This procedure was repeated at each tier of subsequent transactions until all of the contract water supplies provided by non-major water providers could be tracked to an end user, identified as a WUG or part of a WUG.

The remaining water supplies that were entered in *Table 3H-1* are other permit amounts or assumed local supplies. These entries are generally non-municipal users. Moreover, with the exception of livestock and mining supplies, the only noncontract supplies that were considered for *Table 3H-1* are the supplies associated with the records listed in *Table 3A-1*.

Supply Allocation

After the data collection process was completed, the contract and non-contract supplies were allocated to each WUG on a county/basin basis. If a portion of the water acquired through a contract by a WUG was provided to another WUG, through a contract or direct retailing, or by using another intermediary seller, the amount associated with the initial WUG was modified accordingly to avoid double accounting of water. Within each category (county-other, manufacturing, mining, steam-electric, livestock, irrigation), all entities receiving water directly from the same source or obtaining water via contracts from the same provider/self provider and from the same source were aggregated into a single record.

Non-municipal contract supplies were allocated to a specific county/basin unit where possible. This involved the determination of the correct county and basin location for each recipient. Use of the historical data from the water use reports provided by TWDB was instrumental in this process. For example, the COH WWP currently has a wholesale contract with the manufacturing entity, Dixie Chemical Company. It was found that Dixie Chemical is using the water in Harris County in the San Jacinto-Brazos River Basin. Therefore, the current contract supply amount for Dixie Chemical would be added to the overall manufacturing supply available in Harris County, in the San Jacinto-Brazos Basin, and receiving water from the same source (in this case, Lake Livingston).

The allocation of the municipal contract supplies was more complex. Most of the water providers that receive water via a wholesale agreement have retail customers that are in their service areas. Retail customers are defined here as those recipients of water that pay for their service through some means other than a wholesale agreement (i.e., monthly billings). There is not a well-defined methodology for determining the amount of water available to these types of users. For the most part, the availability of water for these WUGs at the city/county level was assessed on a case-by-case basis. For those municipal WUGs that were divided into more than one basin, the availability to each basin was based on the basin's proportionate share of the city/county surface water demand.

For water rights for irrigation that were not found to be sold through contract, such as irrigation rights owned by individuals, the entire supply was allocated to irrigation. Irrigation contracts were used, where available, to determine what portion of a water provider's water right was actually sold for irrigation use. Most of the irrigation supplies are year-to-year contract supplies that are allocated differently with each growing season. For the most part, providers of irrigation water sell water to irrigators in their immediate vicinity. It was assumed that irrigation water rights provided water to the basin in which they originated unless known contracts allocated the water to another location. Contracted water supplies for irrigation were assumed to serve customers along the canal system in which it was conveyed.

The 2006 Plan assumed that livestock demands not met by groundwater were supplied by water available from local surface supply sources (i.e., stock ponds). Much of the mining demand for surface water also appeared to be supplied from local sources. However, it was assumed that these supplies would not increase in quantity over the planning period and alternative sources would be required to supplement any growth in demand. The year 2000 local supply quantity was held constant through the year 2060. The 2011 Plan will retain the local supply volumes recommended in the 2006 Plan.

3.4.4.1 Municipal Contracts Allocation

Anahuac

The City of Anahuac receives 1,105 acre-feet per year from the CLCND. This amount was split between the Neches-Trinity and Trinity River Basins based on the surface water demand ratios, by basin.

Angleton

The City of Angleton receives approximately 2,016 acre-feet per year from Brazosport Water Authority (BWA) (nonmajor water provider), and provides 202 acre-feet per year (approximately 10 percent) to manufacturing in the Brazoria County/San Jacinto-Brazos Basin (assumed that the split is for the entire length of the contract between City of Angleton and BWA). The amount remaining for the City of Angleton is 1,815 acre-feet per year.

Bacliff MUD

Bacliff MUD is contracted to receive 1,373 acre-feet per year from GCWA for municipal use.

Bayou Vista

Bayou Vista receives 519 acre-feet per year from GCWA.

City of Baytown

Baytown Area Water Authority (BAWA) receives 17,534 acre-feet per year from COH and provides water to several water supplies and to the City of Baytown. BAWA provided information regarding the amounts distributed to each of its customers. It was assumed that the BAWA customers Fresh Water Supply District 1-A, Harris County Fresh Water Supply District 1-B, Harris County Fresh Water Supply District 27, Lake MUD, Country Terrace, and Cedar Bayou represent county-other in the Trinity-San Jacinto Basin. The allocation of BAWA's contract is shown below.

- Baytown 15,934 ac-ft/yr
- Harris County WCID 1 784 ac-ft/yr
- Harris County-Other (Trinity-San Jacinto) 816 ac-ft/yr

The amount of water that the City of Baytown receives was calculated based on the surface water demand. The part of Baytown located in Harris County is also located in two different basins, Trinity-San Jacinto and San Jacinto. The amounts entered in these basins were prorated based on the surface water demands.

Bellaire

Bellaire receives 1,310 acre-feet per year of blended surface water and groundwater from the COH. As the groundwater reduction plan for the area progresses the amount of groundwater used will decrease significantly. The entirety of this contract was assumed to be made up of surface water and was allocated to municipal use.

Bolivar Peninsula SUD

Bolivar SUD contracts to receive 5,550 acre-feet per year from LNVA. It was assumed that 1 acre-feet per year of this contract could be used to provide water to county-other in the Neches-Trinity basin, leaving 5,549 acre-feet per year available to Bolivar SUD. The contracted supply is projected to decrease from 5,550 acre-ft per year in 2010 to 5,300 acre-ft per year in 2060.

Brazoria

Brazoria has a contract with BWA for 336 acre-feet per year, and the entire contract was allocated to the City of Brazoria. The City of Brazoria is located in two different basins, the Brazos and Brazos-Colorado. The contract amount was prorated between these two basins based on the total water demand ratios for these two basins.

Bunker Hill Village

The COH provides 635 acre-feet per year of blended water to Bunker Hill Village. This entire supply was allocated as surface water as the portion of this supply from surface water will increase throughout the groundwater reduction plan.

Chimney Hill MUD

Chimney Hill MUD receives water under a contract from the COH. COH provides 426 acre-feet of groundwater/year to the MUD, and it was assumed the groundwater was obtained from the San Jacinto River Basin.

Clear Brook City MUD

The Clear Brook City MUD receives 1,680 acre-feet per year from the COH for municipal use. The MUD is a partner in the Southeast Water Purification Plant.

Clear Lake Shores

Based on information received from Galveston County WCID 12, this water provider serves Clear Lake Shores, Kemah, Lazy Bend (county-other), and a small number of customers in League City. Water provided to Kemah is sold wholesale to the City of Kemah, and then to other customers. All other sales by the district are carried out directly between WCID 12 and the customer. The WCID 12 contract from GCWA was split between Kemah and other customers in the district according to the ratio of usage between Kemah and WCID 12. The portion of water allocated to WCID 12 was further divided among Clear Lake Shores, League City, and county-other according to the number of connections served in each community. League City also receives a majority of its water from the GCWA. The resulting volumes for each WUG are:

- Kemah 64 ac-ft/yr
- League City (Galveston County) 13 ac-ft/yr
- Lazy Bend (WCID 12) 799 ac-ft/yr
- Clear Lake Shores 155 ac-ft/yr

Central Harris County Regional Water Authority (CHCRWA)

CHCRWA has a contract with the COH for 2,375 acre-feet per year.

Clute

The City of Clute has a contract with BWA for 1,120 acre-feet per year; the entire contract was allocated to City of Clute.

County-Other in Brazoria County

BWA has contracts with Clemens Unit-TDCJ and Wayne Scott Unit-TDCJ for 420 acre-feet per year. The demands of these units were considered part of the county-other demand; therefore, since these units are located in Brazoria County, they were allocated to county-other in Brazoria County. The portion for the Clemens Unit was allocated to the Brazos-Colorado Basin while the Wayne Scott Unit supply contract was allocated to the San Jacinto-Brazos River Basin.

County-Other in Fort Bend County

Fort Bend County WCID 2 has an option contract with GCWA for 11,762 acre-feet per year. This contract was reduced so that GCWA contracts did not exceed supplies. Based on the information received from the contacted person, this amount, if used, would be split among its customers. Since GCWA provides retail water to its customers, an exact amount is difficult to estimate; therefore, GCWA estimated the amounts for each entity listed below:

- Missouri City 87 ac-ft/yr
- Sugar Land (San Jacinto-Brazos River Basin) 30 ac-ft/yr
- Harris County MUD 122 (assumed Harris County-other, San Jacinto River Basin) 195 ac-ft/yr
- Fort Bend County, unincorporated area (assumed Fort Bend County-other, San Jacinto-Brazos River Basin) 73 ac-ft/yr
- Stafford 6,194 ac-ft/yr

The amount indicated for Stafford and Missouri City was divided by basin and county according to surface water demand.

County-Other in Harris County

Several water providers including WWPs provide water to county-other in Harris County. These contributions are described below.

The provider with the alpha number 1095 in *Appendix 3H* is the La Porte Area Water Authority (LAWA). LAWA has a contract with COH for 8,734.6 acre-feet per year. According to the information received from LAWA, LAWA provides water to the cities of La Porte, Shoreacres, and Morgans Point. The volumes of water are shown below.

- Shoreacres 406 ac-ft/yr
- Morgans Point (entered as Harris County-Other) 688 ac-ft/yr
- City of La Porte 8,656 ac-ft/yr

As Morgans Point resides within both the San Jacinto and San Jacinto-Brazos River Basins, the water provided to county-other was split based on area. Because Morgans Point is divided fairly equally by the two basins, the 616 acre-feet per year was split in half.

North Channel Water Authority receives 6,682 acre-feet per year from COH that can be split among its customers. A summary of water usage for several years was provided by NCWA and used to prorate the COH contract amount among NCWA customers on a basis of their total water use. Municipal users that were not listed as individual WUGs were combined into county-other. The amount of contract water allocated to each WUG is shown below.

- Harris County FWSD 6 187 ac-ft/yr
- Harris County FWSD 47 288 ac-ft/yr
- Harris County FWSD 51 1,539 ac-ft/yr
- Harris County MUD 53 836836 ac-ft/yr
- Harris County WCID 21 913 ac-ft/yr
- Harris County WCID 36 802 ac-ft/yr
- Harris County WCID 84 310 ac-ft/yr
- Pine Trails Utility 480 ac-ft/yr
- County-Other 281 ac-ft/yr
- Manufacturing 1,046 ac-ft/yr

The City of Pasadena receives water from COH, and it is one of the Southeast Purification Plant participants. Contract information was not available from the City of Pasadena and therefore information used in the 2006 Region H Regional Water Plan was used for the current plan. Based on the information received from the City of Pasadena for the 2006 Regional Water Plan, its customers are City of Seabrook (which in turn provides some of this water to the City of El Lago), manufacturing companies located in Harris County (San Jacinto-Brazos River Basin), and Clear Lake City Water Authority (CLCWA). These amounts are shown below.

- Seabrook and El Lago 1,120 ac-ft/yr
- County-Other 3,360 ac-ft/yr
- Manufacturing 5,040 ac-ft/yr

The remaining supply from Pasadena was assumed to be available to satisfy the demands of the City of Pasadena.

The Fort Bend County WCID 2 contract allocation was described under county-other in Fort Bend County. The amount allocated to county-other in Harris County is 349 acre-feet per year.

Baytown Area Water Authority provides water to several communities in Harris County that are not listed as WUGs. This water was allocated to Harris county-other. The BAWA contract allocation is described under Baytown.

Municipal customers of the COH that were not itemized as WUGs were combined into county-other, based on the customer's location. COH provides groundwater to the San Jacinto, San Jacinto-Brazos, and Trinity-San Jacinto River Basins for use by county-other WUGs.

County-Other in Galveston County

The 275 acre-feet contract between GCWA and Bayview MUD was allocated to county-other in Galveston County. The COH has a contract to supply Galveston County with 18,477 acre-feet per year for municipal use and it was assumed that this amount provided supply to the portion of Galveston County in the San Jacinto-Brazos basin. It was also assumed that the infrastructure that provides LNVA water to Bolivar SUD also provides water to county-other in the Neches-Trinity basin.

County-Other in Montgomery County

COH provides 381 acre-feet per year to Montgomery County MUD 98. The entirety of this amount was allocated to county-other.

County-Other in Polk County

The 20 acre-feet per year TRA supply allocated is the sum of contracts to Memorial Point Townhouse Association and Fountain Lake Townhouse Association.

County-Other in San Jacinto County

Waterwood MUD has a contract for 560 acre-feet per year from the Trinity River Authority. This supply was allocated to county-other in the Trinity River Basin.

County-Other in Trinity County

Three contracts from TRA were entered as county-other category in Trinity County. One of the contracts for 1,000 acre-feet per year, listed for "Individual Domestic Use" was entirely allocated to county-other in Trinity County. Westwood Shores MUD is the recipient of 108 acre-feet per year from TRA, and it represents part of the demand of the county-other category in Trinity County. Westwood Shores POA receives 10 acre-feet per year from the TRA. The other contract entered in this category is part of the Trinity County Regional Water Supply System (TCRWSS) contract. TCRWSS has a contract with TRA for 3,360 acre-feet per year. TCRWSS provides water, on a retail basis, to the WUGs of Trinity, Groveton (located in Region H and I), and Riverside Water Supply. It was assumed that enough water would be provided to each WUG TCRWSS serves to meet demands and that the remaining contract would be allocated to county-other in Trinity County.

County-Other in Walker County

Most of the contract of 22,403 acre-feet per year that the Huntsville Regional Water Supply System (HRWSS) has with TRA was allocated to the City of Huntsville. A small portion of this contract (15 percent) was allocated to county-other, based on the assumption that there are unincorporated areas in the vicinity of Huntsville that are supplied by the city. This amount was split by basin based on the water demand ratios.

Crosby

Crosby MUD serves the City of Crosby and has a contract with SJRA for 1,120 acre-feet per year. Based on the information received from the City of Crosby, all the water is used for residential purposes except a small amount that is supplied to a manufacturing company located in Harris County. The City of Crosby receives 1,050 acre-feet per year. The remaining 70 acre-feet is allocated to the manufacturing category in Harris County, San Jacinto River Basin.

Deer Park

The City of Deer Park has a contract with COH for 3,956 acre-feet per year, and Deer Park uses the entire amount for residential purposes. The contract was split by basins based on the surface water demand ratios.

Dickinson

Galveston County WCID 1 has a contract with GCWA for 5,224 acre-feet per year and provides this water to Dickinson, Texas City, and League City, which are all retail customers. The contract amount, after adjustment, is equal to 3,232 acre-feet per year. Based on the information received from Galveston County WCID 1, it provides water to 50 houses in Texas City, League City pays for 1 mgd (it currently uses 150,000 gallons/day), and the rest goes to Dickinson. For all decades, Texas City was allocated an amount equal to 2.5 persons/house and a 150 gallons per day per person. League City was allocated the 1 mgd contract.

El Lago

The City of Seabrook receives water from the City of Pasadena and then sells the water to El Lago. The volume of water provided by Pasadena was split between Seabrook and El Lago based on surface water demands. The contract with the City of Pasadena is for 1,120 acre-feet per year.

Freeport

BWA has a contract with Freeport for 2,240 acre-feet per year. Based on the information received from the City of Freeport, 85 percent of this contract is allocated to the City of Freeport, and the remaining 15 percent is allocated to different manufacturers in the San Jacinto-Brazos and Brazos River Basins.

Friendswood

Friendswood has a contract with COH for 6,719 acre-feet per year and is one of the Southeast Purification Plant participants. The contract is entirely allocated to municipal use for the City of Friendswood. The contract was split in two entries in different counties, based on the surface water demand ratios for the two counties.

Galena Park

Galena Park has a contract with COH for 1,008 acre-feet per year. Galena Park personnel indicated that 94.6 percent of this contract goes to municipal use for the City of Galena Park. The remaining 5.4 percent of the contract amount is supplied to manufacturing use in Harris County in the San Jacinto River Basin. Galena Park receives 954 acre-feet per year. Manufacturing in the San Jacinto River Basin receives the balance of the contract, or 54 acre-feet per year.

Galveston

Galveston receives 24,217 acre-feet per year from GCWA. This water is distributed among the city and two wholesale customers, Galveston County MUD 1 and Jamaica Beach. Galveston no longer serves customers that are not located on Galveston Island. As these customers receive water on a retail basis, it is difficult to determine a set amount provided to each one. Instead, this volume of water was divided among the three recipients according to their surface water demands in each decade.

Galveston County MUD 1

The Galveston County MUD 1 surface supply is divided out of the total supply from GCWA to the City of Galveston according to its demand ratio among the other two recipients as described under Galveston.

Galveston County WCID 12

The division of the GCWA supply to Galveston County WCID 12 and the WUGs it provides water to, is described under Clear Lake Shores.

Groveton

Groveton receives 119 acre-feet per year from TCRWSS in 2010, as explained in the county-other in Trinity County section above. This allocation represents the amount supplied to the portion of Groveton located within Region H.

Harris County FWSD 6

Harris County FWSD is provided 187 acre-feet of water per year from NCWA as described under county-other in Harris County.

Harris County FWSD 47

Harris County FWSD 47 receives 288 acre-feet per year of water from NCWA. This amount was allocated as described under county-other for Harris County.

Harris County FWSD 51

Harris County FWSD 51 is also a customer of NCWA and is provided a portion of water according to the description under county-other in Harris County. The estimated supply to FWSD 51 is 1,539 acre-feet per year.

Harris County MUD 8

COH has a contract with Harris County MUD 8 to provide 420 acre-feet of groundwater.

Harris County MUD 53

NCWA provides an estimated 836 acre-feet per year of supply to Harris County MUD 53. This estimate is described for county-other in Harris County.

Harris County MUD 55

The COH provides 3,877 acre-feet per year to Harris County MUD 55. This contract is perpetual and was assumed to continue throughout the planning periods.

Harris County MUD 158

Harris County MUD 158 receives 411 acre-feet of groundwater per year from COH. It was assumed that this water originated from the San Jacinto River Basin.

Harris County MUD 261

Harris County MUD 261 and Windfern Forest UD receive 140 acre-feet of groundwater/year from COH. This amount was split between the two districts according to surface water demands.

Harris County WCID 1

BAWA has a contract to provide 784 acre-feet per year to Harris County WCID 1.

Harris County WCID 21

NCWA provides 913 acre-feet of water per year to Harris County WCID 21 as described under county-other in Harris County.

Harris County WCID 36

The description for county-other in Harris County explains the allocation of water from NCWA and includes the 802 acre-feet per year provided to Harris County WCID 36.

Harris County WCID 84

Harris County WCID 84 provides 310 acre-feet of water per year to Channelview from its source, NCWA. The assignment of this supply is described under county-other in Harris County.

Hedwig Village

Memorial Villages Water Authority (MVWA) has a contract with COH for 747 acre-feet per year of blended water. It was assumed for planning purposes that this water originated from a surface source. Based on the information received from MVWA, this contract is split between Hedwig Village, Piney Point Village, and Hunters Creek. Since these entities are retail customers, without information on exact amounts, the contract was split among the customers based on their total water demand ratios for each planning period.

Hitchcock

Hitchcock is a customer of GCWA and is contracted to receive 1,731 acre-feet per year on a perpetual basis.

Houston

The City of Houston, in its capacity as water provider to residents within the city limits, receives its water from several sources that are operated as a system. The available supply of this system, less contracts to other parties, was assumed to make up the available supply for Houston. This total volume was distributed among the individual occurrences of the Houston WUG in each basin and county.

Additionally, the Clear Lake City Water Authority provides a portion of its contract from COH to areas of Houston. As some of the authority's contracts are indefinable, it was assumed that Webster and Pasadena received a share of water prorated by the area served in each community. The amounts of water remaining was assumed to serve Clear Lake (a portion of the Houston WUG). The amounts of water provided to each CLCWA customer are shown below.

- City of Houston 8,076 ac-ft/yr
- City of Pasadena 8,619 ac-ft/yr

- Taylor Lake Village 1,730 ac-ft/yr
- Nassau Bay 2,184 ac-ft/yr
- Manufacturing 1,792 ac-ft/yr

Humble

The City of Houston provides 47 acre-feet of groundwater per year to Humble.

Hunters Creek Village

This entity receives its water from the MVWA. As described under Hedwig Village, the amount of water that MVWA receives from COH was shared among its customers based on the surface water demand ratios.

Huntsville

Huntsville receives 22,403 acre-feet of groundwater per year from the Huntsville Regional Water Supply System (HRWSS). Approximately 15 percent of this water is allocated to county-other to support surrounding communities. The remaining supply was allocated to the City of Huntsville.

Jacinto City

Jacinto City has a contract with COH for 1,120 acre-feet per year, and the entire amount of the contract is allocated to municipal use in Jacinto City.

Jamaica Beach

The City of Galveston provides water to Jamaica Beach, as described under Galveston. The portion of water provided to Jamaica Beach for each planning period was prorated from the GCWA supply according to the surface water demands of each end user customer.

Jersey Village

The City of Jersey village has a contract with COH for 840 acre-ft per year of groundwater.

Kemah

Galveston County WCID 12 provides water to Kemah, as described for Clear Lake Shores.

La Marque

The GCWA contract to La Marque was reduced from 3,207 to 2,224 acre-feet per year. The contract is entirely allocated for municipal usage.

La Porte

The La Porte Area Water Authority receives water from COH and then distributes water to the City of La Porte and other customers. The City of La Porte receives 8,656 acre-feet per year, as described previously at county-other in Harris County. This contract was split between the city’s WUGs in the San Jacinto and San Jacinto-Brazos River Basins.

Lake Livingston Water Supply & Sewer Service Company

The Lake Livingston Water Supply & Sewer Service Company has a contract for 954 acre-feet per year from the TRA. The supply was split according to demand.

Lake Jackson

Lake Jackson receives water from BWA, and the entire contract of 2,240 acre-feet per year is allocated to municipal use for Lake Jackson.

League City

League City receives the majority of its water from two providers, GCWA and Galveston County WCID 1. The League City contract with GCWA is for 2,307 acre-feet per year. League City also contracts for 1 mgd with Galveston County WCID 1. Galveston County WCID 12 also provides a small amount of water to customers in a portion of League City in Harris County. This is shown under Clear Lake Shores.

Livingston

Livingston receives water from the Livingston Regional Water Supply System. The entire amount, 5,601 acre-feet per year, is allocated to Livingston for its municipal use.

Missouri City

Missouri City has a contract with GCWA for 16,802 acre-feet per year. However, this amount was reduced to 9,487 to reflect the supply available from the GCWA. The other provider for Missouri City is Fort Bend WCID 2. The amount received by Missouri City from Fort Bend County WCID 2 is shown above, at county-other in Fort Bend County. Missouri City in Fort Bend County is split by basins based upon surface water demand ratios.

Nassau Bay

Nassau Bay receives water from Clear Lake City Water Authority (CLCWA). The current amount contracted, 2,184 acre-feet per year, is assumed to remain constant through 2060. Nassau Bay uses the whole amount contracted for its municipal use.

North Fort Bend Water Authority (NFBWA)

The COH has a contract with the North Fort Bend Water Authority which supplies 21,841 acre-feet per year of water. The COH will activate the supply to the (NFBWA) in the year 2013.

North Harris County Regional Water Authority

NHCRWA has a contract with COH for 11 acre-feet per year until 2010. Beginning in 2010, the authority will receive 34,714 acre-feet of surface water/year.

Oyster Creek

Oyster Creek receives water from BWA, and the entire contract, 106 acre-feet per year, is allocated for municipal use in Oyster Creek.

Pasadena

Pasadena receives water from COH and from CLCWA. The COH contract allocation is described under county-other in Harris County. The CLCWA contribution to Pasadena was described above under Houston.

Pearland

Pearland has a contract with GCWA with an available supply of 15,675 acre-feet per year, valid until 2010, and a contract with COH for 560 acre-feet per year until 2041. Pearland is located in Harris and Brazoria Counties. Therefore, these contracts are split between the two counties based on surface water demand.

Pecan Grove

Pecan Grove receives 3,101 acre-ft of water contracted from the BRA via the GCWA. Although Pecan Grove has already contracted supply from the BRA, construction of a surface water treatment plant to treat the raw water will not begin construction until 2010. Pecan Grove is located in Fort Bend County and the contract is allocated for 3,101 acre feet per year for municipal use.

Pine Trails Utility

Pine Trails Utility is a customer of NCWA and receives 480 acre-feet per year as estimated under county-other in Harris County.

Piney Point Village

Memorial Villages Water Authority (MVWA) provides Piney Point Village with water from its contract with COH. As described above, under Hedwig Village and Hunters Creek Village, this contract is split between the MVWA customers.

Richmond

The City of Richmond has two municipal contracts with the Brazos River Authority for a total amount of 3,000 acre-feet per year.

Richwood

Richwood receives water from BWA, and the entire contract of 263 acre-feet per year is allocated for municipal use by Richwood.

Riverside WS Corp

Riverside WS Corp receives 20 acre-feet of water/year from TCRWS as mentioned above in county-other for Trinity County. This amount was allocated to Walker County as San Jacinto County had no shortages for this WUG.

Rosenberg

Rosenberg receives water from the Brazos River Authority and the contract of 4,500 acre-feet per year is allocated for municipal use by Rosenberg.

San Jacinto WSC

San Jacinto Water Supply Corporation receives 280 acre-feet per year from TRA. Coldspring is included in their service area, but since Coldspring has enough groundwater to meet its demand, this contract was allocated entirely to the San Jacinto Water Supply Company.

San Leon

San Leon receives 2,059 acre-feet per year of water from GCWA. The entire contract amount is allocated to the municipal use in San Leon.

Santa Fe

Santa Fe (Galveston County WCID 8) has a contract with GCWA for 1,154 acre-feet per year.

Seabrook

The Pasadena contract was split between El Lago and Seabrook as described under El Lago.

Shoreacres

La Porte provides water to Shoreacres, as shown in the allocation of the contract between the La Porte Area Water Authority and COH described under county-other in Harris County.

South Houston

As one of the Southeast Water Purification Plant partners, South Houston has a contract with COH for 4199 acre-feet per year. The contract is entirely allocated to municipal use for the City of South Houston.

Southside Place

Southside Place has a contract with COH for 319 acre-feet per year, and the entire contract is used to meet its municipal demands.

Stafford

Stafford receives water from Fort Bend County WCID 2. Fort Bend County WCID 2 has an option contract with GCWA. The contract allocation is described above at county-other in Fort Bend County. The amount that Stafford receives is split between Fort Bend County and Harris County based on surface water demand ratios. The amount allocated to the part of Stafford located in Fort Bend County is split by basins, between San Jacinto and San Jacinto-Brazos River Basins, based on their surface water demand ratios.

Sugar Land

Sugar Land has two water providers. Fort Bend County WCID 2 provides water to some residents of Sugar Land, and the amount allocated is described under county-other in Fort Bend County. This amount is assumed to serve the portion of Sugar Land located in the San Jacinto-Brazos River Basin. GCWA has a contract with the City of Sugar Land for 22,403 acre-feet per year. This contract was adjusted to 12,533 acre-feet per year and is entirely allocated to the City of Sugar Land for its municipal use. The GCWA contract amount was split by basins based on the surface water demand ratios.

Sunbelt FWSD

The City of Houston provides 187 acre-feet of groundwater per year to the Sunbelt FWSD, in addition to 299 acre-feet of blended water/year. This blended supply is assumed to be surface water in *Appendix 3H*. Sunbelt is also a member of the COH Groundwater Reduction Plan.

Taylor Lake Village

Clear Lake City Water Authority provides 1,730 acre-feet of water per year to Taylor Lake Village. The allocation of the CLCWA contract with COH was described under Houston.

Texas City

Texas City has two water providers. The entity providing the largest amount is GCWA. The contract from GCWA is 12,016 acre-feet per year and is used entirely by the City of Texas City for its municipal water usage. The other provider is Galveston County WCID 1, and the allocation of its contract with GCWA is summarized under Dickinson. This small amount of water was estimated to be approximately 21 acre-feet per year.

The Woodlands

The Woodlands receives 11,303 acre-feet per year of groundwater from SJRA. The available groundwater supply is projected to be diminished over time as a result of groundwater availability and projected surface water conversion.

Tiki Island

Tiki Island receives water from GCWA under a contract for 415 acre-feet per year.

Trinity

Trinity receives water from TCRWSS. The allocation of the TCRWSS contract is described under county-other in Trinity County and is equal to the TWDB demands for Trinity.

Trinity Bay Conservation District

The Trinity Bay Conservation District receives 663 acre-feet per year from CLCND. LNVA provides an additional sum of water on an as-needed basis to the district through the Winnie Treatment Plant. When the new Winnie Water Treatment Plant is completed, the district will have the capacity to receive 2.4 mgd of water from LNVA. Therefore, it is assumed that the available supply from the Rayburn-Steinhagen system is 2,688 acre-feet per year. These supplies were split between the Trinity and Neches-Trinity River Basins according to demand.

Trinity Rural WS Corp

The Trinity Rural WSC supply is provided 1,240 acre-feet per year by TRA. The supply was split between the Polk, Trinity and Walker Counties based on demand.

Webster

The City of Webster has a contract with COH for 4,536 acre-feet per year and is using the entire contract amount for its municipal water use. CLCWA provides an additional 4,475 acre-feet per year from their surface water allocation from COH.

West Harris County Regional Water Authority

WHCRWA will begin a contract with COH for 20,437 acre-feet per year in 2010. This amount was allocated between the portions of WHCRWA located in Harris and Fort Bend Counties based on surface water demand.

West University Place

The City of West University Place has a contract with COH for 2,053 acre-feet of groundwater/year, and it is using the entire contract amount for its municipal water use.

Windfern Forest UD

Windfern Forest UD shares a 140 acre-feet per year contract with Harris County MUD 261. This amount was split between the two districts according to their demands in each decade as described under Harris County MUD 261.

3.4.4.2 Manufacturing Supplies

BRAZORIA COUNTY

Brazoria County manufacturing supplies are allocated below.

Provider	2010	2020	2030	2040	2050	2060
	(acre-feet/year)					
Angleton	202	202	202	202	202	202
Dow	137,475	137,475	137,475	137,475	137,475	137,475
Freeport	336	336	336	336	336	336
GCWA	45,010	45,010	45,010	45,010	45,010	45,010
BRA	16,000	16,000	16,000	16,000	16,000	16,000
Individual Water Rights	11,354	11,422	11,422	11,422	11,422	11,422

The supply listed by the City of Angleton is provided from their contract from BWA. The Dow supply represents the company's firm water right and assumes that the full quantity is either contracted to other entities or used for the Dow facility itself. The 16,000 acre-feet listed from BRA is contracted to Dow. Freeport allocates approximately 15 percent of its contract from BWA to manufacturing, providing the value listed above. The sum of GCWA contracts to manufacturers in the San Jacinto-Brazos River Basin totals 45,010 acre-feet per year (after adjustment in order to observe available supplies). All contract amounts were allocated to the basin in which the consumer was located. Water rights intended for manufacturing were allocated to the basin the source originated in. Individual water rights in the Brazos-Colorado basin total 12,019 acre-feet per year and are available to Region H and Region K. A portion of these water rights are allocated to steam electric demands in Region K. The remainder is allocated to Manufacturing in Brazoria County, shown in the table above.

FORT BEND COUNTY

Fort Bend County manufacturing supplies are allocated below.

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
BRA	400	400	400	400	400	400
FBC WCID 1	1,000	1,000	1,000	1,000	1,000	1,000

The Fort Bend County WCID 1 has a contract with Imperial Sugar for 1,000 acre-feet per year. Originally, this contract was for the entire 20,000 acre-feet per year yield from this right. However, this was reduced due to Imperial Sugar's plant closure. This contract was allocated to the San Jacinto-Brazos River Basin. The 400 acre-feet per year shown from BRA is contracted to Vulcan Materials.

GALVESTON COUNTY

Galveston County manufacturing supplies are allocated below.

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	68,414	68,414	68,414	68,414	68,414	68,414

The GCWA amount represents the sum of contracts between the Gulf Coast Water Authority and manufacturers in Galveston County, San Jacinto-Brazos River Basin. This sum is adjusted so that the total GCWA contracts do not exceed supplies.

HARRIS COUNTY

Harris County manufacturing supplies are allocated below.

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
COH	379,312	379,312	379,312	379,312	379,312	379,312
Crosby	70	70	70	70	70	70
CLCWA	1,792	1,792	1,792	1,792	1,792	1,792
Galena Park	54	54	54	54	54	54
NCWA	1,046	1,046	1,046	1,046	1,046	1,046
Pasadena	5,040	5,040	5,040	5,040	5,040	5,040
SJRA	75,703	75,703	75,703	75,703	75,703	75,703

The COH amount includes Houston contracts to manufacturers in Harris County. The appropriate portions of the contract sum were allocated to the basin in which the manufacturer was located. The supplies from Crosby and Galena Park represent portions of their contracted supplies provided for manufacturing. The Pasadena supply was split between the San Jacinto and San Jacinto-Brazos River Basins according to surface water demand. The sum of SJRA contracts was split according to the location of the contract customer.

A portion of the water provided by COH, equal to 23,404 acre-feet per year, is actually contracted to Lyondell-Citgo Refining. This water is used for refinery processes by LCR as well as 16,733 acre-feet/year of steam-electric demand by a customer of LCR. Attempts were made to contact LCR regarding how this water is used, which user receives the water first, and which portion of the water is reused between the two users. Lyondell-Citgo was unable to provide any information regarding this use pattern and, therefore, the total sum of water has been shown in the shortage analysis and the table above with COH as the provider.

3.4.4.3 Irrigation Supplies

BRAZORIA COUNTY

Brazoria County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	13,694	13,694	13,694	13,694	13,694	13,694
Individual Water Rights	10,529	10,529	10,529	10,529	10,529	10,529

The water supply listed as individual water rights consists of the firm water rights within each basin. It was assumed that this water was used for agriculture within the source basin.

CHAMBERS COUNTY

Chambers County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
CLCND	40,000	40,000	40,000	40,000	40,000	40,000
LNVA	38,000	38,000	38,000	38,000	38,000	38,000
TRA	16,818	16,552	16,370	16,170	15,941	15,669
Individual Water Rights	23,995	23,995	23,995	23,995	23,995	23,995

The CLCND amount represents the volume of water provided to Devers Canal customers in the Neches-Trinity River Basin by the CLCND. The LNVA amount is the sum of annual irrigation contracts to individuals in the Neches-Trinity River Basin. The water supplied by TRA represents the amount contributed to the Devers Canal system, split between Chambers and Liberty Counties according to irrigation surface demand in the basins served by the canal. In Chambers County, this water was only provided to the Neches-Trinity River Basin. Individual water rights for irrigation were assumed to be applied within the basin from which they originated.

FORT BEND COUNTY

Fort Bend County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	2,143	2,143	2,143	2,143	2,143	2,143
NRG	12,000	12,000	12,000	12,000	12,000	12,000

The GCWA supply represents the adjusted contract amounts between GCWA and several irrigators in the San Jacinto-Brazos River Basin. The supply from NRG represents the firm irrigation supply from the Brazos River Basin contracted to Richmond Irrigation. It was assumed that this entire amount was used within the Brazos River Basin. The balance of this water right was allocated to steam-electric in the Brazos basin.

GALVESTON COUNTY

Galveston County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	142	142	142	142	142	142

The GCWA allocated amounts equal the contracted volume of water to irrigation users in Galveston County.

HARRIS COUNTY

Harris County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
SJRA	1,476	1,476	1,476	1,476	1,476	1,476
Individual Water Rights	1,355	1,355	1,355	1,355	1,355	1,355

The SJRA amount is equal to the current irrigation contracts between SJRA and customers in Harris County. It was assumed that these annual contracts ran perpetually and that they served irrigation demands in the San Jacinto River Basin.

LIBERTY COUNTY

Liberty County irrigation allocations are tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
COH	33,000	33,000	33,000	33,000	33,000	33,000
Devers Canal	2,500	2,500	2,500	2,500	2,500	2,500
LNVA	17,200	17,200	17,200	17,200	17,200	17,200
TRA	10,682	10,948	11,130	11,130	11,559	11,831

The COH supply was purchased from the Dayton Canal Irrigation Company and is assumed to be provided to irrigators within the Trinity River Basin. The Devers Canal irrigation supply listed above is from a water right from the Trinity River and was split between the basins served by the Devers Canal system based on demand. This supply has recently been purchased by the Lower Neches Valley Authority (LNVA). The LNVA amount is the sum of the authority's contracts to individual farmers, assumed to be located in the Neches-Trinity River Basin. The volume of water provided to irrigation by TRA is Liberty County's share of the TRA contribution to the Devers Canal system. The water rights available to irrigation in Liberty County were allocated to the basin in which the supply originated.

MONTGOMERY COUNTY

Montgomery County irrigation allocation is tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
SJRA	880	880	880	880	880	880

The SJRA amount is the sum of water contracts between SJRA and irrigators in Montgomery County. These year to year contracts were assumed to be renewed through 2060.

SAN JACINTO COUNTY

San Jacinto County irrigation allocation is tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
TRA	135	135	135	135	135	135

The TRA amount allocated is the sum of two contracts between Royal Pines and Waterwood National Resort and TRA.

TRINITY COUNTY

Trinity County irrigation allocation is tabulated below.

Irrigator	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
TRA	290	290	290	290	290	290

The TRA amount allocated is a lump sum of contracts between several water recipients and TRA. The sum of these contracts, 290 acre-feet per year, is the sum of all the individual irrigation amount contracts in Trinity County.

3.4.4.4 Mining Supplies

FORT BEND COUNTY

Fort Bend County mining supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	583	583	583	583	583	583

The GCWA contract provides water to Texas Brine in the San Jacinto-Brazos River Basin.

3.4.4.5 Steam-Electric Supplies

CHAMBERS COUNTY

Chambers County steam-electric supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
NRG	30,000	30,000	30,000	30,000	30,000	30,000

The portion shown above is provided through Water Right 3460903926 from Cedar Bayou owned by NRG.

FORT BEND COUNTY

Fort Bend County steam-electric supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
NRG	111,711	111,711	111,711	111,711	111,711	111,711

The sum of supplies represents two individual rights owned by NRG for use in the Brazos River Basin (Water Rights 3461205320 and 3461205325 (28,711 acre-feet per year)) and a contract from BRA for 83,000 acre-feet per.

GALVESTON COUNTY

Galveston County steam-electric supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
GCWA	2,231	2,231	2,231	2,231	2,231	2,231

The GCWA portion represents the sum of two contracts to steam-electric WUGs in the San Jacinto-Brazos River Basin. These contracts have been adjusted according to the procedures outlined above to limit GCWA contracts to available supplies.

HARRIS COUNTY

Harris County steam-electric supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
COH	14,369	14,369	14,369	14,369	14,369	14,369

The COH supply is provided to two steam-electric WUGS in the San Jacinto River Basin. Water Right 3461105350 (2120 acre-feet per year) from Clear Creek was cancelled by NRG and is not assumed to be available for use in power generation.

MONTGOMERY COUNTY

Montgomery County steam-electric supplies are allocated below:

Provider	2010 ac-ft/yr	2020 ac-ft/yr	2030 ac-ft/yr	2040 ac-ft/yr	2050 ac-ft/yr	2060 ac-ft/yr
SJRA	7,841	7,841	7,841	7,841	7,841	7,841

The SJRA supply from Lake Conroe provides water to Entergy for steam-electric use.

3.4.5 Wholesale Water Providers

The resources available to Water User Groups (WUGs) in Region H through Wholesale Water Providers (WWPs) are listed in *Appendix 3I.* The Appendix lists the WWPs that supply water directly to WUGs and lists if the water is “self supplied” or contracted from another WWP. In instances where supplies are contracted from another WWP, the supplier is listed in the “Source WWP” column. This list was compiled with the use of the TCEQ Water Rights Database, WAM and GAM results, contract information and clarifications received directly from the WWPs, and the allocation of groundwater resources shown above.

For the sake of this study, water supplies that are contracted by customers from the City of Houston and delivered via the CWA system have been included with the data for COH. Similarly, TRA is listed as the wholesale water provider for supplies provided by the Trinity County Regional Water Supply System, Huntsville Regional Water Supply System, and Livingston Regional Water Supply System as these providers are operated by TRA.

The groundwater supplies shown in *Table 3-14* represent the groundwater supplied to a WUG by the WWP and not groundwater used by a WUG from its own wells. These amounts of groundwater are generally the available supply as determined by the groundwater allocation method described above. However, COH was known to provide specified amounts of groundwater to its contract customers. Therefore, for the COH WWP, the available supply of groundwater is equal to the groundwater supplied to the Houston WUG plus the sum of groundwater contracts to customers. The groundwater available to NCWA is equal to the sum of groundwater allocated to its customers as it was assumed that NCWA is the only source of water for these customers. Fort Bend County WCID #2 was assumed to provide groundwater to the city of Meadows. Galveston County WCID 1 was allocated the groundwater associated with Dickinson as part of its available supply. The Woodlands is provided water by SJRA, and the groundwater that was available to The Woodlands was assumed to originate from SJRA. Finally, CHCRWA, NFBWA, NHCRWA, the City of Galveston, City of Pasadena, WHCRWA, Sugarland, Missouri City, Richmond-Rosenberg and the City of Huntsville were allocated the groundwater associated with each of the WUGs by the same name.

The volume of WWP supplies available to individual WUGs was determined through contract information from the WWPs, previous records, and further clarification from both the providers and customers. Where it was not possible to determine specific contract amounts to each WUG, other methods were used to approximate the supply to each WUG as described above in the groundwater and surface water allocation sections.

The 2060 supplies available to each WWP are shown below in *Table 3-14*. Wholesale Water Providers that receive water from another WWP through contractual transfer are listed below the original provider.

The surface water supplies are summarized by county, basin and category of use in *Table 3-15*. Similarly, *Tables 3-16* and *Table 3-17* summarize the groundwater and reuse supplies, respectively. An updated shortage analysis will be included in *Chapter 4* based on projected demands described in *Chapter 2*. During the development of the 2011 Region H Water Plan it was noted that several counties in Region H had experienced significant population growth indicating that current and future demands may be higher than previously projected. As a result, shortages in later decades may become greater than projected. If that occurs additional shortages may be met with alternative strategies described later in *Chapter 4.* The current surface water supplies are summarized by category of water use by basin by WWP in *Appendix 3J.*

Table 3-14

Summary of Supplies Available to Region H Wholesale Water Providers in 2060

Wholesale Water Provider*	Available Supplies (acre-feet)		
	Contracts**	Groundwater	Surface Water Rights
Brazos River Authority[1]			155,031
Dow Chemical Company	16,000		137,475
Gulf Coast Water Authority[2]	44,980		214,260
City of Galveston	25,406	1,539	
Fort Bend County WCID #2	6,579	796	
Galveston County WCID 1[3]	3,232	309	
Missouri City	9,645	9,340	
NRG[4]	83,000		94,220
Sugarland	12,563	9,027	
Richmond-Rosenburg	7,500	4,279	
Brazosport Water Authority			16,492
Chambers-Liberty Counties Navigation District[5]			76,520
Fort Bend County WCID 1			5,634
City of Houston[6]		83,818	1,254,628
Baytown Area Water Authority	17,534		
Central Harris County Regional Water Authority[7]	2,375	1,287	
Clear Lake City Water Authority[8]	26,876		
La Porte Area Water Authority	9,750		
North Channel Water Authority[9]	6,682	1,645	
North Fort Bend Water Authority[10]	21,434	26,643	
North Harris County Regional Water Authority[11]	34,714	30,558	
City of Pasadena[12]	38,514	2,047	
West Harris County Regional Water Authority[13]	20,437	16,521	
Lower Neches Valley Authority[14]			64,177
San Jacinto River Authority[15]		7,359	232,744
Trinity River Authority			403,200
City of Huntsville	22,403	5,164	

*WWPs that provide water through contract to other WWPs are shown with the customer WWPs listed below the sellers.

**Water received under contract from another WWP.

[1] Available supplies represent contractual agreements to Region H customers only. Supply quantities are for the amount of water currently contracted to Region H customers by BRA.

[2] GCWA contracts with its customers exceed available firm yield supplies. For the purpose of the shortage analysis, contracts were adjusted not to exceed supplies.

[3] Supplies include GCWA contract and maximum amount of groundwater allowed for Dickinson per HGSD regulations.

[4] Supplies include contractual demands to Richmond Irrigation and Brazos Valley Energy, as well as the entire portion of the GCWA contract, which is assumed to be used by NRG. Actual demands may be greater but are overall split among supply sources since actual data is unavailable.

[5] CLCND supply includes rights from Lake Anahuac, less 30,000 acre-feet sold to SJRA.

[6] Groundwater supply includes the portion of groundwater provided to Houston after prorating available, restricted supplies to WUGs, plus groundwater contracted to other WWPs. Demands include contracts to BAWA, CLCWA, LPAWA, Lyondell-Citgo, NCWA, NHCRWA, Pasadena, and WHCRWA WWPs. Surface water rights for COH include 33,000 acre-feet purchased from the Dayton Canal Irrigation Company; it is allocated entirely to irrigation demands in Liberty County.

[7] Available Groundwater Supplies are supplied by the CHCRWA, not contracted from the City of Houston.

[8] Assumes all water remaining after contracts is provided to Clear Lake (Houston WUG).

[9] NCWA groundwater supply estimated from the 2003-2004 ratio of groundwater to contract water. Demands were assumed to equal supplies.

[10] Available Groundwater Supplies are supplied by the NFBWA, not contracted from the City of Houston.

[11] Available Groundwater Supplies are supplied by the NHCRWA, not contracted from the City of Houston.

[12] Includes total Pasadena demands, less the portion met by CLCWA.

[13] Available Groundwater Supplies are supplied by the WHCRWA, not contracted from the City of Houston.

[14] Supplies represent contractual agreements to Region H customers only. Supply quantities are for the entire Rayburn-Steinhagen system and do not represent the portion available to Region H.

[15] Includes water demands and available groundwater supplied to The Woodlands. The 2060 groundwater supply shown above is the least amount of groundwater available throughout the planning periods. Also includes 14,944 acre-feet of permitted indirect reuse.

Table 3-15

Surface Water Supply by Categories of Water Use in Each County and Basin

County	Basin	Use	Available Supplies (acre-feet per year)					
			Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
AUSTIN	COLORADO	LIVESTOCK	52	56	58	59	60	61
BRAZORIA	BRAZOS	IRRIGATION	1,850	1,850	1,850	1,850	1,850	1,850
		LIVESTOCK	220	228	232	235	236	238
		MANUFACTURING	153,763	153,763	153,763	153,762	153,742	153,762
		MINING	190	190	190	190	190	190
		MUNICIPAL	223	199	183	172	162	154
	BRAZOS-COLORADO	LIVESTOCK	200	202	206	210	217	225
		MANUFACTURING	11,354	11,422	11,422	11,422	11,422	11,422
		MINING	1,124	1,124	1,124	1,124	1,124	1,124
		MUNICIPAL	478	478	478	478	478	478
	SAN JACINTO-BRAZOS	IRRIGATION	25,131	25,131	25,131	25,131	25,131	25,131
		LIVESTOCK	545	505	547	591	643	690
		MANUFACTURING	45,260	45,260	45,260	45,261	45,281	45,261
		MINING	305	305	305	305	305	305
		MUNICIPAL	23,155	23,223	23,259	23,280	23,302	23,320
CHAMBERS	NECHES-TRINITY	IRRIGATION	116,568	116,302	116,120	115,920	115,691	115,419
		LIVESTOCK	317	317	317	317	317	318
		MINING	505	505	505	505	505	505
		MUNICIPAL	3,806	3,863	3,931	4,007	4,092	4,191
	TRINITY	LIVESTOCK	50	50	50	50	51	51
		MINING	18,989	18,989	18,989	18,989	18,989	18,989
		MUNICIPAL	1,595	1,623	1,653	1,688	1,729	1,774
	TRINITY-SAN JACINTO	IRRIGATION	2,185	2,185	2,185	2,185	2,185	2,185
		LIVESTOCK	48	49	51	52	53	54
		MINING	4,722	4,722	4,722	4,672	4,601	4,502
		MUNICIPAL	821	891	950	996	1,040	1,084
		STEAM ELECTRIC POWER	30,000	30,000	30,000	30,000	30,000	30,000
FORT BEND	BRAZOS	IRRIGATION	12,000	12,000	12,000	12,000	12,000	12,000
		LIVESTOCK	0	207	415	415	415	415
		MANUFACTURING	400	400	400	400	400	400
		MUNICIPAL	15,242	16,028	16,131	16,259	16,515	16,822
		STEAM ELECTRIC POWER	111,711	111,711	111,711	111,711	111,711	111,711
	SAN JACINTO	LIVESTOCK	13	30	47	47	47	47
		MINING	8	8	8	8	8	8
		MUNICIPAL	8,529	18,494	18,408	18,680	19,121	19,261
	SAN JACINTO-BRAZOS	IRRIGATION	2,143	2,143	2,143	2,143	2,143	2,143
		LIVESTOCK	64	98	139	139	139	139
		MANUFACTURING	1,000	1,000	1,000	1,000	1,000	1,000
		MINING	517	517	517	517	517	517
		MUNICIPAL	19,478	31,008	33,159	34,283	35,559	36,584
GALVESTON	NECHES-TRINITY	MINING	106	106	106	106	106	106
		MUNICIPAL	5,550	5,500	5,450	5,400	5,350	5,300

County	Basin	Use	Available Supplies (acre-feet per year)					
			Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
	SAN JACINTO-BRAZOS	IRRIGATION	142	142	142	142	142	142
		LIVESTOCK	306	296	280	280	280	281
		MANUFACTURING	68,414	68,414	68,414	68,414	68,414	68,414
		MINING	101	101	101	101	101	101
		MUNICIPAL	77,993	78,258	78,403	78,465	78,509	78,538
		STEAM ELECTRIC POWER	2,231	2,231	2,231	2,231	2,231	2,231
HARRIS	SAN JACINTO	IRRIGATION	1,476	1,476	1,476	1,476	1,476	1,476
		LIVESTOCK	324	666	803	803	803	803
		MANUFACTURING	364,933	364,933	364,961	364,970	364,975	364,973
		MINING	992	992	992	992	992	992
		MUNICIPAL	404,719	435,032	464,366	499,737	537,217	543,310
		STEAM ELECTRIC POWER	14,369	14,369	14,369	14,369	14,369	14,369
	SAN JACINTO-BRAZOS	LIVESTOCK	82	82	82	82	82	82
		MANUFACTURING	55,739	55,739	55,711	55,702	55,697	55,699
		MINING	19	19	19	19	19	19
		MUNICIPAL	58,484	60,167	61,852	63,786	65,854	66,182
	TRINITY-SAN JACINTO	IRRIGATION	1,355	1,355	1,355	1,355	1,355	1,355
		LIVESTOCK	73	73	73	73	73	73
		MANUFACTURING	42,345	42,345	42,345	42,345	42,345	42,345
		MUNICIPAL	17,100	17,033	16,978	16,934	16,892	16,851
LIBERTY	NECHES	IRRIGATION	2,500	2,500	2,500	2,500	2,500	2,500
		LIVESTOCK	45	45	45	45	45	70
	NECHES-TRINITY	IRRIGATION	19,269	19,228	19,199	19,170	19,134	19,093
	TRINITY	IRRIGATION	44,113	44,420	44,631	44,860	45,125	45,438
		MUNICIPAL	72	71	72	73	77	80
	TRINITY-SAN JACINTO	IRRIGATION	685	685	685	685	685	685
		LIVESTOCK	0	0	0	0	0	17
MONTGOMERY	SAN JACINTO	IRRIGATION	880	880	880	880	880	880
		LIVESTOCK	510	510	510	510	510	510
		STEAM ELECTRIC POWER	7,841	7,841	7,841	7,841	7,841	7,841
POLK	TRINITY	MUNICIPAL	6,236	6,225	6,221	6,221	6,230	6,237
SAN JACINTO	SAN JACINTO	MUNICIPAL	63	70	73	75	75	74
	TRINITY	IRRIGATION	135	135	135	135	135	135
		MUNICIPAL	977	990	1,004	1,013	1,012	1,008
TRINITY	TRINITY	IRRIGATION	290	290	290	290	290	290
		LIVESTOCK	211	211	211	211	211	211
		MUNICIPAL	5,615	5,598	5,590	5,587	5,577	5,573
WALKER	SAN JACINTO	LIVESTOCK	0	1	12	8	9	11
		MUNICIPAL	17,606	17,211	17,244	17,291	17,367	17,454
	TRINITY	LIVESTOCK	106	127	138	143	148	154
		MUNICIPAL	4,925	5,322	5,283	5,230	5,157	5,073
WALLER	BRAZOS	LIVESTOCK	232	232	232	232	242	277
	SAN JACINTO	LIVESTOCK	90	90	90	90	102	107
Total			1,843,815	1,899,087	1,932,954	1,971,925	2,013,605	2,021,690

Table 3-16

Groundwater Supply by Categories of Water Use in Each County and Basin

County	Basin	Use	Available Supplies (acre-feet per year)					
			Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
AUSTIN	BRAZOS	IRRIGATION	743	743	743	743	743	743
		LIVESTOCK	1,211	1,211	1,211	1,211	1,211	1,211
		MANUFACTURING	172	172	172	172	172	172
		MINING	40	40	40	40	40	40
		MUNICIPAL	3,638	3,462	3,353	3,283	3,250	3,215
	BRAZOS-COLORADO	IRRIGATION	9,874	9,874	9,874	9,874	9,874	9,874
		LIVESTOCK	339	339	339	339	339	339
		MANUFACTURING	38	38	38	38	38	38
		MINING	4	4	4	4	4	4
		MUNICIPAL	459	459	459	459	459	459
	COLORADO	LIVESTOCK	13	9	7	6	5	4
		MINING	7	7	7	7	7	7
		MUNICIPAL	26	26	26	26	26	26
BRAZORIA	BRAZOS	LIVESTOCK	22	14	10	7	6	4
		MANUFACTURING	24,125	4,493	4,026	3,597	3,116	2,600
		MINING	117	28	28	28	28	28
		MUNICIPAL	2,257	2,122	2,097	2,075	2,056	2,045
	BRAZOS-COLORADO	IRRIGATION	4,765	4,277	4,089	3,976	3,976	3,976
		LIVESTOCK	204	202	198	194	187	179
		MINING	1,728	1,440	1,440	1,440	1,440	1,440
		MUNICIPAL	2,869	2,858	2,847	2,834	2,827	2,825
	SAN JACINTO-BRAZOS	LIVESTOCK	423	423	421	377	325	278
		MINING	640	624	624	624	624	624
		MUNICIPAL	13,250	13,113	13,082	13,058	13,051	13,053
CHAMBERS	NECHES-TRINITY	IRRIGATION	3,890	3,884	3,880	3,879	3,876	3,876
		LIVESTOCK	16	16	16	16	16	15
		MINING	30	30	30	30	30	30
		MUNICIPAL	47	45	43	42	41	40
	TRINITY	IRRIGATION	5,688	5,464	5,330	5,207	5,089	4,988
		LIVESTOCK	10	10	10	10	9	9
		MINING	4,907	4,907	4,907	4,907	4,907	4,907
		MUNICIPAL	201	197	195	193	191	190
	TRINITY-SAN JACINTO	IRRIGATION	530	509	472	439	409	379
		LIVESTOCK	21	20	18	17	16	15
		MANUFACTURING	3,538	3,538	3,538	3,538	3,538	3,538
		MINING	2,561	2,561	2,561	2,511	2,440	2,341
		MUNICIPAL	282	278	273	268	265	262
		STEAM ELECTRIC POWER	1,330	1,018	1,104	1,208	1,332	1,468

FORT BEND	BRAZOS	IRRIGATION	5,907	5,907	5,907	5,907	5,907	5,907
		LIVESTOCK	691	484	276	276	276	276
		MANUFACTURING	1,235	907	538	538	538	538
		MINING	618	441	255	255	255	255
		MUNICIPAL	30,481	23,372	16,990	16,966	16,966	16,966
		STEAM ELECTRIC POWER	11,316	11,316	11,316	11,316	11,316	11,316
	BRAZOS-COLORADO	IRRIGATION	18,869	18,869	18,869	18,869	18,869	18,869
		LIVESTOCK	211	211	211	211	211	211
		MINING	140	140	140	140	140	140
		MUNICIPAL	706	552	662	720	798	819
	SAN JACINTO	IRRIGATION	7,538	7,538	7,538	7,538	7,538	7,538
		LIVESTOCK	57	40	23	23	23	23
		MANUFACTURING	1,979	1,453	862	862	862	855
		MINING	272	200	116	116	116	116
		MUNICIPAL	28,134	25,090	16,923	16,913	16,910	16,910
	SAN JACINTO-BRAZOS	IRRIGATION	6,998	6,998	6,998	6,998	6,998	6,998
		LIVESTOCK	135	101	60	60	60	60
		MANUFACTURING	3,649	2,679	1,588	1,588	1,588	1,588
		MINING	1,455	1,408	814	822	830	838
		MUNICIPAL	46,394	41,389	31,085	31,051	31,049	30,149
GALVESTON	NECHES-TRINITY	LIVESTOCK	2	2	2	2	2	2
		MINING	14	14	14	14	14	14
	SAN JACINTO-BRAZOS	IRRIGATION	1,020	1,020	1,020	1,020	1,020	1,020
		LIVESTOCK	3	3	3	3	3	3
		MANUFACTURING	4,101	4,101	4,101	4,101	4,101	4,101
		MINING	13	13	13	13	13	13
		MUNICIPAL	4,444	4,395	4,349	4,303	4,273	4,275
HARRIS	SAN JACINTO	IRRIGATION	9,883	9,883	9,883	9,883	9,883	9,883
		LIVESTOCK	666	285	190	190	190	190
		MANUFACTURING	51,293	51,293	51,293	51,293	51,293	51,293
		MINING	126	126	126	126	126	126
		MUNICIPAL	253,507	168,337	147,713	147,659	147,639	147,647
	SAN JACINTO-BRAZOS	LIVESTOCK	9	9	9	9	9	9
		MANUFACTURING	6,692	6,692	6,692	6,692	6,692	6,692
		MINING	2	2	2	2	2	2
		MUNICIPAL	6,002	5,279	5,222	5,124	5,111	5,120
		STEAM ELECTRIC POWER	44	44	44	44	44	44
	TRINITY-SAN JACINTO	IRRIGATION	5,417	5,417	5,417	5,417	5,417	5,417
		LIVESTOCK	18	18	18	18	18	18
		MANUFACTURING	7,261	7,261	7,261	7,261	7,261	7,261
		MUNICIPAL	1,528	1,408	1,452	1,452	1,452	1,452
LEON	BRAZOS	LIVESTOCK	423	423	423	423	423	423
		MINING	221	213	209	205	201	198
		MUNICIPAL	488	488	488	488	488	488
	TRINITY	IRRIGATION	542	542	542	542	542	542

		LIVESTOCK	1,268	1,268	1,268	1,268	1,268	1,268
		MANUFACTURING	714	714	714	714	714	714
		MINING	1,296	1,251	1,226	1,204	1,183	1,166
		MUNICIPAL	1,640	1,640	1,640	1,640	1,640	1,640
LIBERTY	NECHES	IRRIGATION	12	12	12	12	12	12
		LIVESTOCK	59	59	59	59	59	34
		MINING	32	32	32	32	32	32
		MUNICIPAL	241	241	241	241	241	241
	NECHES-TRINITY	IRRIGATION	375	374	372	369	368	367
		LIVESTOCK	35	35	35	35	35	35
		MINING	23	23	23	23	23	22
		MUNICIPAL	11	11	11	11	11	11
	SAN JACINTO	IRRIGATION	830	830	830	830	830	830
		LIVESTOCK	140	140	140	140	140	140
		MANUFACTURING	331	331	331	331	331	331
		MINING	34	34	34	34	34	34
		MUNICIPAL	2,865	2,865	2,865	2,865	2,865	2,865
	TRINITY	IRRIGATION	10,367	8,078	6,416	4,597	2,447	0
		LIVESTOCK	446	446	446	446	446	446
		MANUFACTURING	62	62	62	62	62	62
		MINING	4,924	4,880	4,836	4,794	4,747	4,695
		MUNICIPAL	7,166	7,166	7,166	7,166	7,166	7,166
		STEAM ELECTRIC POWER	2,962	2,962	2,962	2,962	2,962	2,962
	TRINITY-SAN JACINTO	IRRIGATION	5,683	5,643	5,608	5,573	5,535	5,507
		LIVESTOCK	32	32	32	32	32	15
		MINING	3,717	3,717	3,717	3,717	3,717	3,717
		MUNICIPAL	187	187	187	187	187	187
MADISON	BRAZOS	LIVESTOCK	120	120	120	120	120	120
		MINING	9	9	9	9	9	9
		MUNICIPAL	106	106	106	106	106	106
	TRINITY	IRRIGATION	19	19	19	19	19	19
		LIVESTOCK	630	630	630	630	630	630
		MANUFACTURING	260	260	260	260	260	260
		MINING	15	15	15	15	15	15
		MUNICIPAL	1,687	1,660	1,643	1,692	1,688	1,657
MONTGOMERY	SAN JACINTO	IRRIGATION	51	38	31	26	21	18
		LIVESTOCK	393	293	239	199	161	132
		MANUFACTURING	1,576	1,344	1,224	1,127	997	888
		MINING	370	293	247	212	177	148
		MUNICIPAL	57,722	52,532	53,909	52,949	49,746	47,142
		STEAM ELECTRIC POWER	3,888	3,885	3,879	3,873	3,864	3,852
POLK	TRINITY	LIVESTOCK	134	134	134	134	134	134
		MINING	29	29	29	29	29	29
		MUNICIPAL	2,919	2,919	2,919	2,919	2,919	2,919
SAN JACINTO	SAN JACINTO	LIVESTOCK	142	142	142	142	142	142

		MANUFACTURING	48	48	48	48	48	48
		MINING	23	23	22	21	20	20
		MUNICIPAL	1,345	1,345	1,345	1,345	1,345	1,345
	TRINITY	IRRIGATION	532	532	532	532	532	532
		LIVESTOCK	142	142	142	142	142	142
		MINING	7	6	6	6	6	6
		MUNICIPAL	2,650	2,650	2,650	2,650	2,650	2,551
TRINITY	TRINITY	IRRIGATION	467	467	467	467	467	467
		MINING	6	6	6	6	6	6
		MUNICIPAL	805	805	800	782	762	734
WALKER	SAN JACINTO	IRRIGATION	5	5	5	5	5	5
		LIVESTOCK	310	309	298	302	301	299
		MANUFACTURING	577	577	577	577	577	577
		MINING	7	7	7	7	7	7
		MUNICIPAL	8,546	6,422	6,714	6,444	6,548	6,602
	TRINITY	IRRIGATION	6	6	6	6	6	6
		LIVESTOCK	216	195	184	179	174	168
		MANUFACTURING	2,631	2,422	2,111	2,312	2,352	2,369
		MINING	6	6	6	6	6	6
		MUNICIPAL	4,080	4,254	4,359	3,739	3,434	3,049
WALLER	BRAZOS	IRRIGATION	4,825	4,825	4,825	4,825	4,825	4,825
		LIVESTOCK	444	444	444	444	434	399
		MANUFACTURING	17	17	17	17	17	17
		MINING	9	9	9	9	9	9
		MUNICIPAL	4,061	4,061	4,061	4,061	4,061	4,061
	SAN JACINTO	IRRIGATION	18,153	17,679	18,153	18,140	16,561	14,755
		LIVESTOCK	173	173	173	173	161	156
		MANUFACTURING	72	72	72	72	72	72
		MINING	71	71	71	71	71	71
		MUNICIPAL	1,570	1,502	1,491	1,491	1,491	1,491
Total			777,845	641,359	591,590	586,814	578,644	569,361

Table 3-17

Reuse Supply by Categories of Water Use in Each County and Basin

County	Basin	Use	Available Supplies (acre-feet per year)					
			Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	438	14,799	14,840	14,866
Total			0	0	438	14,799	14,840	14,866

Appendix 3A

Current Water Supply Sources Available During Drought of Record Conditions

This Page Intentionally
Left Blank

Region H

Table 3A-1: Current Water Supply Sources Available During Drought of Record Conditions

Source Name	Source Type	Source RWPG	Source Basin	Source County	Basin ID	County ID	Source ID	Source Supply (acre-ft /year) 2010	2020	2030	2040	2050	2060
BRAZOS RIVER ALLUVIUM AQUIFER	01-GW	H	BRAZOS	AUSTIN	12	008	00805	8,607	8,607	8,607	8,607	8,607	8,607
GULF COAST AQUIFER	01-GW	H	BRAZOS	AUSTIN	12	008	00815	9,668	9,668	9,668	9,668	9,668	9,668
GULF COAST AQUIFER	01-GW	H	BRAZOS-COLORADO	AUSTIN	13	008	00815	11,200	11,200	11,200	11,200	11,200	11,200
GULF COAST AQUIFER	01-GW	H	COLORADO	AUSTIN	14	008	00815	46	46	46	46	46	46
GULF COAST AQUIFER	01-GW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	02015	35,904	35,904	35,904	35,904	35,904	35,904
GULF COAST AQUIFER	01-GW	H	BRAZOS	BRAZORIA	12	020	02015	7,192	7,192	7,192	7,192	7,192	7,192
GULF COAST AQUIFER	01-GW	H	BRAZOS-COLORADO	BRAZORIA	13	020	02015	7,304	7,304	7,304	7,304	7,304	7,304
UNDIFFERENTIATED AQUIFER	01-GW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	02022	167	167	167	167	167	167
GULF COAST AQUIFER	01-GW	H	NECHES-TRINITY	CHAMBERS	07	036	03615	3,990	3,990	3,990	3,990	3,990	3,990
GULF COAST AQUIFER	01-GW	H	TRINITY	CHAMBERS	08	036	03615	10,806	10,806	10,806	10,806	10,806	10,806
GULF COAST AQUIFER	01-GW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	03615	8,205	8,205	8,205	8,205	8,205	8,205
SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	00-SW	I	NECHES	RESERVOIR	06		060A0	820,000	820,000	820,000	820,000	820,000	820,000
BRAZOS RIVER ALLUVIUM AQUIFER	01-GW	H	BRAZOS	FORT BEND	12	079	07905	23,452	23,452	23,452	23,452	23,452	23,452
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	FORT BEND	10	079	07915	39,095	35,294	26,088	26,077	26,073	26,066
GULF COAST AQUIFER	01-GW	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	07915	58,704	59,008	43,197	43,085	43,171	42,325
GULF COAST AQUIFER	01-GW	H	BRAZOS	FORT BEND	12	079	07915	43,577	36,306	29,505	29,715	30,073	30,490
GULF COAST AQUIFER	01-GW	H	BRAZOS-COLORADO	FORT BEND	13	079	07915	26,649	25,320	20,459	20,459	20,627	20,905
LIVINGSTON-WALLISVILLE LAKE/RESERVOIR	00-SW	H	TRINITY	RESERVOIR	08		084H0	1,344,000	1,289,000	1,265,000	1,294,000	1,344,000	1,344,000
GULF COAST AQUIFER	01-GW	H	NECHES-TRINITY	GALVESTON	07	084	08415	30	30	31	31	31	31
GULF COAST AQUIFER	01-GW	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	08415	10,084	10,343	10,837	10,789	10,761	10,763
HOUSTON LAKE/RESERVOIR	00-SW	H	SAN JACINTO	RESERVOIR	10		10030	187,000	184,200	181,400	178,600	175,800	173,000
GULF COAST AQUIFER	01-GW	H	TRINITY-SAN JACINTO	HARRIS	09	101	10115	14,284	14,699	15,202	15,206	15,211	15,216
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	HARRIS	10	101	10115	317,587	245,596	236,106	236,053	236,035	236,045
GULF COAST AQUIFER	01-GW	H	SAN JACINTO-BRAZOS	HARRIS	11	101	10115	9,682	10,355	11,087	10,989	10,976	10,985
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704290	1,037	1,037	1,037	1,037	1,037	1,037
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704291	1,078	1,078	1,078	1,078	1,078	1,078
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704295	1,199	1,199	1,199	1,199	1,199	1,199
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704299	1,173	1,173	1,173	1,173	1,173	1,173
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704306	1,818	1,818	1,818	1,818	1,818	1,818
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410704311	2,072	2,072	2,072	2,072	2,072	2,072
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3410705016	1,012	1,012	1,012	1,012	1,012	1,012
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3411104449	1,200	1,200	1,200	1,200	1,200	1,200
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3411104509	2,028	2,028	2,028	2,028	2,028	2,028
BRAZOS RIVER AUTHORITY SYSTEM	00-SW	G	BRAZOS	RESERVOIR	12		120E0	727,228	718,350	709,472	700,594	691,717	691,717
CARRIZO-WILCOX AQUIFER	01-GW	H	TRINITY	LEON	08	145	14510	5,213	4,715	4,599	4,556	4,562	4,562
CARRIZO-WILCOX AQUIFER	01-GW	H	BRAZOS	LEON	12	145	14510	1,051	1,013	1,006	993	996	996
QUEEN CITY AQUIFER	01-GW	H	TRINITY	LEON	08	145	14524	4,860	4,860	4,860	4,860	4,860	4,860
QUEEN CITY AQUIFER	01-GW	H	BRAZOS	LEON	12	145	14524	201	201	201	201	201	201
SPARTA AQUIFER	01-GW	H	TRINITY	LEON	08	145	14527	6,895	6,895	6,895	6,895	6,895	6,895
SPARTA AQUIFER	01-GW	H	BRAZOS	LEON	12	145	14527	497	497	497	497	497	497
GULF COAST AQUIFER	01-GW	H	NECHES	LIBERTY	06	146	14615	4,414	4,414	4,414	4,414	4,414	4,414
GULF COAST AQUIFER	01-GW	H	NECHES-TRINITY	LIBERTY	07	146	14615	444	444	444	444	444	444
GULF COAST AQUIFER	01-GW	H	TRINITY	LIBERTY	08	146	14615	21,857	21,857	21,857	21,857	21,857	21,857
GULF COAST AQUIFER	01-GW	H	TRINITY-SAN JACINTO	LIBERTY	09	146	14615	9,619	9,619	9,619	9,619	9,619	9,619
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	LIBERTY	10	146	14615	6,887	6,887	6,887	6,887	6,887	6,887
CARRIZO-WILCOX AQUIFER	01-GW	H	TRINITY	MADISON	08	157	15710	1,460	1,431	1,401	1,354	1,328	1,328
CARRIZO-WILCOX AQUIFER	01-GW	H	BRAZOS	MADISON	12	157	15710	227	217	208	197	190	190
UNDIFFERENTIATED AQUIFER	01-GW	H	TRINITY	MADISON	08	157	15722	334	334	334	334	334	334
QUEEN CITY AQUIFER	01-GW	H	TRINITY	MADISON	08	157	15724	2,625	2,625	2,625	2,625	2,625	2,625
QUEEN CITY AQUIFER	01-GW	H	BRAZOS	MADISON	12	157	15724	145	145	145	145	145	145
SPARTA AQUIFER	01-GW	H	TRINITY	MADISON	08	157	15727	7,576	7,576	7,576	7,576	7,576	7,576
SPARTA AQUIFER	01-GW	H	BRAZOS	MADISON	12	157	15727	441	441	441	441	441	441
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	MONTGOMERY	10	170	17015	64,000	64,000	64,000	64,000	64,000	64,000
GULF COAST AQUIFER	01-GW	H	TRINITY	POLK	08	187	18715	19,117	19,117	19,117	19,117	19,117	19,117
GULF COAST AQUIFER	01-GW	H	TRINITY	SAN JACINTO	08	204	20415	9,863	9,863	9,863	9,863	9,863	9,863
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	SAN JACINTO	10	204	20415	12,006	12,006	12,006	12,006	12,006	12,006
CARRIZO-WILCOX AQUIFER	01-GW	H	TRINITY	TRINITY	08	228	22810	249	249	249	241	241	241
GULF COAST AQUIFER	01-GW	H	TRINITY	TRINITY	08	228	22815	3,714	3,714	3,714	3,714	3,714	3,714
UNDIFFERENTIATED AQUIFER	01-GW	H	TRINITY	TRINITY	08	228	22822	416	416	416	416	416	416
SPARTA AQUIFER	01-GW	H	TRINITY	TRINITY	08	228	22827	245	245	245	245	245	245

Region H
Table 3A-1: Current Water Supply Sources Available During Drought of Record Conditions

Source Name	Source Type	Source RWPG	Source Basin	Source County	Basin ID	County ID	Source ID	Source Supply (acre-ft /year) 2010	2020	2030	2040	2050	2060
CARRIZO-WILCOX AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23610	2,293	2,293	2,293	2,293	2,293	2,293
GULF COAST AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23615	5,845	5,845	5,845	5,845	5,845	5,845
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	WALKER	10	236	23615	12,434	12,434	12,434	12,434	12,434	12,434
UNDIFFERENTIATED AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23622	200	200	200	200	200	200
QUEEN CITY AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23624	75	75	75	75	75	75
SPARTA AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23627	1,760	1,760	1,760	1,760	1,760	1,760
YEGUA-JACKSON AQUIFER	01-GW	H	TRINITY	WALKER	08	236	23631	5,440	5,440	5,440	5,440	5,440	5,440
YEGUA-JACKSON AQUIFER	01-GW	H	SAN JACINTO	WALKER	10	236	23631	960	960	960	960	960	960
BRAZOS RIVER ALLUVIUM AQUIFER	01-GW	H	BRAZOS	WALLER	12	237	23705	9,480	9,480	9,480	9,480	9,480	9,480
GULF COAST AQUIFER	01-GW	H	SAN JACINTO	WALLER	10	237	23715	13,086	13,086	13,086	13,086	13,086	13,086
GULF COAST AQUIFER	01-GW	H	BRAZOS	WALLER	12	237	23715	15,416	15,416	15,416	15,416	15,416	15,416
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	LIBERTY	08	146	3410805271A	2,500	2,500	2,500	2,500	2,500	2,500
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	LIBERTY	08	146	3410805271B	56,000	56,000	56,000	56,000	56,000	56,000
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	FORT BEND	12	079	3461205168	84,000	84,124	84,197	84,230	84,258	84,261
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	FORT BEND	12	079	3461205171	61,083	61,083	61,083	61,083	61,083	61,083
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704287	2,528	2,528	2,528	2,528	2,528	2,528
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704293	1,626	1,626	1,626	1,626	1,626	1,626
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704304B	1,997	1,997	1,997	1,997	1,997	1,997
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	POLK	08	187	3460804261	26,510	26,510	26,510	26,510	26,510	26,510
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	LIBERTY	08	146	3460804277	33,000	33,000	33,000	33,000	33,000	33,000
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	CHAMBERS	08	036	3460804279B	76,520	76,520	76,520	76,520	76,520	76,520
TRINITY RIVER RUN-OF-RIVER	00-SW	H	TRINITY	CHAMBERS	08	036	3460804279	30,000	30,000	30,000	30,000	30,000	30,000
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	3460903926	30,000	30,000	30,000	30,000	30,000	30,000
SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO	HARRIS	10	101	3461004964	55,000	55,000	55,000	55,000	55,000	55,000
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105357A	15,930	15,930	15,930	15,930	15,930	15,930
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105357B	0	0	0	0	0	0
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105357C	0	0	0	0	0	0
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	FORT BEND	12	079	3461205320	29,920	29,920	29,920	29,920	29,920	29,920
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	FORT BEND	12	079	3461205322B	52,980	52,980	52,980	52,980	52,980	52,980
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	FORT BEND	12	079	3461205325	34,300	34,300	34,300	34,300	34,300	34,300
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	BRAZORIA	12	020	3461205328B	137,475	137,475	137,475	137,475	137,475	137,475
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	BRAZORIA	12	020	3461205366	16,492	16,492	16,492	16,492	16,492	16,492
BRAZOS RIVER RUN-OF-RIVER	00-SW	H	BRAZOS	BRAZORIA	12	020	3461205492	1,800	1,800	1,800	1,800	1,800	1,800
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704294	573	573	573	573	573	573
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704300	805	805	805	805	805	805
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704304	2,663	2,663	2,663	2,663	2,663	2,663
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704308	771	771	771	771	771	771
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704309	711	711	711	711	711	711
NECHES-TRINITY RIVER RUN-OF-RIVER	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	3460704312	691	691	691	691	691	691
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	LIBERTY	09	146	3460903909	769	769	769	769	769	769
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	3460903918	976	976	976	976	976	976
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	HARRIS	09	101	3460903922	661	661	661	661	661	661
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	HARRIS	09	101	3460903923	694	694	694	694	694	694
TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	00-SW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	3460903924	1,213	1,213	1,213	1,213	1,213	1,213
CONROE LAKE/RESERVOIR	00-SW	H	SAN JACINTO	MONTGOMERY	10	170	10060	79,800	78,700	77,600	76,500	75,400	74,300
SJRA INDIRECT REUSE	00-SW	H	SAN JACINTO	MONTGOMERY	10	170	3510170	14,944	14,944	14,944	14,944	14,944	14,944
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	3461105169	0	0	0	0	0	0
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	3461105170	5,634	5,634	5,634	5,634	5,634	5,634
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105343	720	720	720	720	720	720
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105344	1,320	1,320	1,320	1,320	1,320	1,320
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105346	2,214	2,214	2,214	2,214	2,214	2,214
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105352	3,271	3,271	3,271	3,271	3,271	3,271
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3461105364	734	734	734	734	734	734
SAN BERNARD RIVER RUN-OF-RIVER	00-SW	H	BRAZOS-COLORADO	BRAZORIA	13	020	3461303421	8,519	8,519	8,519	8,519	8,519	8,519
SAN BERNARD RIVER RUN-OF-RIVER	00-SW	H	BRAZOS-COLORADO	BRAZORIA	13	020	3461303423	3,500	3,500	3,500	3,500	3,500	3,500
LIVESTOCK LOCAL SUPPLY	00-SW	H	NECHES	LIBERTY	06	146	99706146	45	45	45	45	45	70
LIVESTOCK LOCAL SUPPLY	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	99707036	317	317	317	317	317	318
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY	CHAMBERS	08	036	99708036	50	50	50	50	51	51
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY	TRINITY	08	228	99708228	211	211	211	211	211	211
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY	WALKER	08	236	99708236	106	127	138	143	148	154

Region H
Table 3A-1: Current Water Supply Sources Available During Drought of Record Conditions

Source Name	Source Type	Source RWPG	Source Basin	Source County	Basin ID	County ID	Source ID	Source Supply (acre-ft /year) 2010	2020	2030	2040	2050	2060
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	99709036	48	49	51	52	53	54
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY-SAN JACINTO	HARRIS	09	101	99709101	73	73	73	73	73	73
LIVESTOCK LOCAL SUPPLY	00-SW	H	TRINITY-SAN JACINTO	LIBERTY	09	146	99709146	0	0	0	0	0	17
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO	FORT BEND	10	079	99710079	13	30	47	47	47	47
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO	HARRIS	10	101	99710101	324	666	803	803	803	803
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO	MONTGOMERY	10	170	99710170	510	510	510	510	510	510
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO	WALKER	10	236	99710236	0	1	12	8	9	11
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO	WALLER	10	237	99710237	90	90	90	90	102	107
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	99711020	545	505	547	591	643	690
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	99711079	64	98	139	139	139	139
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	99711084	306	296	280	280	280	281
LIVESTOCK LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	HARRIS	11	101	99711101	82	82	82	82	82	82
LIVESTOCK LOCAL SUPPLY	00-SW	H	BRAZOS	BRAZORIA	12	020	99712020	220	228	232	235	236	238
LIVESTOCK LOCAL SUPPLY	00-SW	H	BRAZOS	FORT BEND	12	079	99712079	0	207	415	415	415	415
LIVESTOCK LOCAL SUPPLY	00-SW	H	BRAZOS	WALLER	12	237	99712237	232	232	232	232	242	277
LIVESTOCK LOCAL SUPPLY	00-SW	H	BRAZOS-COLORADO	BRAZORIA	13	020	99713020	200	202	206	210	217	225
LIVESTOCK LOCAL SUPPLY	00-SW	H	COLORADO	AUSTIN	14	008	99714008	52	56	58	59	60	61
OTHER LOCAL SUPPLY	00-SW	H	NECHES-TRINITY	CHAMBERS	07	036	99907036	505	505	505	505	505	505
OTHER LOCAL SUPPLY	00-SW	H	NECHES-TRINITY	GALVESTON	07	084	99907084	106	106	106	106	106	106
OTHER LOCAL SUPPLY	00-SW	H	TRINITY	CHAMBERS	08	036	99908036	18,989	18,989	18,989	18,989	18,989	18,989
OTHER LOCAL SUPPLY	00-SW	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	99909036	4,722	4,722	4,722	4,722	4,722	4,722
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO	FORT BEND	10	079	99910079	8	8	8	8	8	8
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO	HARRIS	10	101	99910101	992	992	992	992	992	992
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO	MONTGOMERY	10	170	99910170	0	0	0	0	0	0
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	99911020	305	305	305	305	305	305
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	99911084	101	101	101	101	101	101
OTHER LOCAL SUPPLY	00-SW	H	SAN JACINTO-BRAZOS	HARRIS	11	101	99911101	19	19	19	19	19	19
OTHER LOCAL SUPPLY	00-SW	H	BRAZOS	BRAZORIA	12	020	99912020	190	190	190	190	190	190
OTHER LOCAL SUPPLY	00-SW	H	BRAZOS	FORT BEND	12	079	99912079	0	0	0	0	0	0
OTHER LOCAL SUPPLY	00-SW	H	BRAZOS-COLORADO	BRAZORIA	13	020	99913020	1,124	1,124	1,124	1,124	1,124	1,124
OTHER LOCAL SUPPLY	00-SW	H	BRAZOS-COLORADO	FORT BEND	13	079	99913079	0	0	0	0	0	0

Appendix 3B

WRAP Input Files

This Page Intentionally
Left Blank

Appendix 3B

Water Availability Model Input Files

These input files are used with the Water Rights Analysis Package (WRAP) available from the TCEQ or the Texas Water Resources Institute at Texas A&M University.

Basin	File Name(s)	Notes
Neches-Trinity	NT_wam3.dat .dis .eva .inf	1, 2
Trinity	TR_wam3_2000.dat TR_wam3_2060.dat TR_wam3_2010_LIVFY.dat TR_wam3_2020_LIVFY.dat TR_wam3_2030_LIVFY.dat TR_wam3_2040_LIVFY.dat TR_wam3_2050_LIVFY.dat TR_wam3_2060_LIVFY.dat TR_wam3_2000_anaFY.dat TR_wam3_2060_anaFY.dat Trin3.flo .dis.eva	3
Trinity-San Jacinto	TRSJ_wam3.dat .dis .eva .inf	1, 2
San Jacinto	SJ_wam3_2000.dat .dis .eva .inf SJ_wam3_2060.dat .dis .eva .inf	
San Jacinto-Brazos	SJBR_wam3.dat .dis .eva .inf	
Brazos	2010_bwam3.dat .dis .eva .inf 2060_bwam3.dat .dis .eva .inf	
Brazos-Colorado	CO_wam3.dat .dis .eva .inf	2, 4

1. The original TCEQ WAM file was used without modification.
2. A 2060 condition model was not required for this basin. There are no on-channel reservoirs in the coastal basin to be affected by sedimentation.
3. Firm yield models for Lake Livingston and Lake Anahuac, using updated area-capacity curves. The Lake Livingston model also includes partial return flows from the upper basin (varied by decade).
4. The Brazos-Colorado basin is included in the Colorado basin WAM

Model files are provided electronically (attached CD). These files may be viewed using a text editor such as Notepad or Wordpad. All four files are required to run the WRAP simulation. The file extensions indicate the type of data included in the file:

Root.dat Basic file containing all input data, except the hydrology related data in the following files.
Root.inf Inflow records with naturalized streamflows
Root.eva Evaporation records with net evaporation-precipitation rates
Root.dis Flow distribution and watershed parameter records for transferring flows from the inflow records to other control points

Additional model runs were conducted for the San Jacinto Basin to determine the firm yield of Lakes Conroe and Houston. In these models, the diversion amount for a given reservoir is adjusted downward until a value is determined that can be reliably diverted in every year of the simulation. This is an iterative process that balances available run-of-river supply and stored water with monthly diversion targets. These models are included in subfolders in this Appendix.

Appendix 3C

Upper Basin Return Flow and Lake Livingston Firm Yield Analysis

Contents

List of Tables

List of Figures

Appendices

Section 1– Executive Summary

1.1 Introduction

Return flows have an important impact on the magnitude and reliability of downstream water rights and have been carefully considered by the Region H Water Planning Group in previous regional water plans. Region H is comprised of eight river and coastal basins with several river basins extending though multiple planning regions. The Trinity River Basin is a major source of water supplies for both Region C and Region H. As a result, projected water demands and water management strategies in both regions have the ability to influence water supply availability. Coordination between lower Trinity Basin supplies located in Region H and upper Trinity Basin supplies in Region C is necessary to protect the firm yield of downstream water rights. During the development of both the 2001 and 2006 Region H Water Plans, the importance of upper basin return flows was recognized.

During the 2006 Region H Regional Water Plan, the firm yield of the Lake Livingston water rights was evaluated assuming that a minimum level of return flows would be available from the upper Trinity Basin throughout the planning period. The 2006 Region H Regional Water Plan took into account future conditions in the Trinity Basin by analyzing the 2060 projected return flows and proposed water management strategies. However, an analysis confirming the minimum level of return flows necessary to make the Lake Livingston water rights firm was not performed. Additionally, a decadal analysis was not performed to verify that the level of return flows projected from the upper Trinity Basin would be sufficient to firm up the Lake Livingston water rights. The analysis concluded that the permitted yield of Lake Livingston would be available throughout the planning period.

1.2 Purpose of Study

As part of the 2011 Region H Regional Water Plan, specific scope items were included to review and evaluate the 2006 Region C Regional Water Plan. The study focused on determining the level of Upper Trinity Basin return flows projected in each planning decade as a result of increased demands and levels of reuse. The Water Rights Analysis Package (WRAP) was utilized to perform the following tasks:

- Evaluate return flows available to Region H at the Oakwood Gage (gage located between Region C and Region H).
- Determine if projected return flows would be sufficient to maintain the firm yield of the Lake Livingston water rights for each planning decade.
- Identify the minimum level of return flows necessary to maintain the firm yield.
- Perform a decadal firm yield analysis on Lake Livingston water rights.

This Page

Intentionally Left Blank

Section 2 – Projected Return Flows

Lake Livingston is dependent upon return flows from upstream Region C in the upper Trinity Basin. As a result of its downstream location, Lake Livingston indirectly benefits from growth in the Dallas–Fort Worth Metroplex. As upstream demands increase in Region C, it is anticipated that the importation of out-of-basin supplies will increase, providing additional return flows to the lower basin. Although return flows will likely increase over time, the timing of developing reuse supplies may have an adverse effect on the Lake Livingston water rights, temporarily reducing the in-basin return flows. To calculate the projected level of return flows in the upper Trinity Basin, a desktop analysis of Region C WUG demands and reuse strategies was performed and compared to previous estimates performed by the Region C Consultant.

The analysis was performed in the following order:

- Region C WUG Demands in the Trinity Basin were obtained from the TWDB DB07 database.
- Region C conservation strategies for WUGs in the Trinity Basin were totaled from the TWDB DB07 database.
- Net demands were calculated by subtracting conservation strategy volumes from WUG demands.
- Total return flows were calculated by assuming return flow factors (RFs) from the 2008 Region C draft Conservation and Reuse Study (December, 2008).
- Existing and proposed reuse strategies were summarized from information in the *2006 Region C Regional Water Plan, Chapter 3*.
- The net instream return flows in Region C were estimated by subtracting proposed reuse volumes from total return flows.

2.1 Region C Demands

Region C demands from the 2006 Region C Regional Water Plan were summarized using data obtained from the TWDB DB07 online database. *Table 1* lists the municipal demands in the upper Trinity Basin by county and decades. Demands in the upper Trinity Basin are projected to increase to approximately 3,000,000 million acre-feet/year by 2060. The largest demand centers are Dallas, Collin, Denton and Tarrant Counties which encompass the Dallas-Fort Worth Metroplex. A full list of the WUGs and projected water demand summarized in the table below is provided in *Appendix A*.

Table 1 Projected Municipal Demands in the Upper Trinity Basin by County

Values in Acre-feet per Year

County	2010	2020	2030	2040	2050	2060
Collin	205,085	283,825	338,957	403,157	463,042	528,034
Cooke	6,806	7,711	8,658	9,459	10,641	11,669
Dallas	664,648	744,647	798,544	849,619	926,206	1,032,662
Denton	160,915	215,320	270,575	318,575	367,531	423,718
Ellis	27,766	35,225	43,561	52,850	63,927	77,145
Fannin	717	876	1,226	1,822	2,594	3,293

County	2010	2020	2030	2040	2050	2060
Freestone	2,831	3,127	3,321	3,498	3,663	3,828
Grayson	4,643	7,463	9,413	10,703	11,916	13,032
Henderson	10,316	12,495	14,645	16,862	19,553	22,888
Jack	1,089	1,177	1,256	1,321	1,385	1,449
Kaufman	17,835	25,020	30,198	34,950	40,226	46,845
Navarro	9,637	10,748	11,730	12,817	14,109	15,712
Parker	15,697	27,903	37,011	41,868	47,113	51,875
Rockwell	15,720	24,933	30,700	34,588	36,757	38,445
Tarrant	376,889	434,790	488,467	550,239	626,628	713,176
Wise	10,801	15,310	18,991	22,501	26,814	31,494
Total	1,531,395	1,850,570	2,107,253	2,364,829	2,662,105	3,015,265

The industrial demands in the Upper Trinity Basin are listed in *Table 2* by County and decade and are projected to increase to nearly 100,000 acre-feet/year by 2060. The largest demand centers are Dallas and Tarrant Counties part of the Dallas-Fort Worth Metroplex. A full list of the WUGs and projected water demand summarized in the table below is provided in *Appendix B*.

Table 2 Projected Industrial Demands by County

Values in Acre-feet per Year

County	2010	2020	2030	2040	2050	2060
Collin	3,607	4,137	4,654	5,170	5,633	6,115
Cooke	273	306	335	364	389	421
Dallas	34,115	37,791	41,148	44,214	46,703	46,983
Denton	1,068	1,239	1,408	1,579	1,731	1,880
Ellis	3,466	3,670	3,841	3,987	4,089	3,912
Fannin	0	0	0	0	0	0
Freestone	0	0	0	0	0	0
Grayson	2	2	2	2	2	2
Henderson	110	118	133	151	172	195
Jack	0	0	0	0	0	0
Kaufman	760	813	869	928	993	1,061
Navarro	1,172	1,328	1,468	1,607	1,730	1,872
Parker	548	618	685	751	809	878
Rockwell	12	14	16	17	19	21
Tarrant	17,258	20,444	23,630	26,924	29,919	32,457
Wise	2,313	2,660	2,979	3,277	3,539	3,858
Total	64,704	73,140	81,168	88,971	95,728	99,655

2.2 Projected Conservation

Projected Conservation supplies are listed below in *Table 3* by County. A full list of the WUGs and projected water demand summarized in the table below is provided in *Appendix C*.

Table 3 Projected Conservation by County

Values in Acre-feet per Year

County	2010	2020	2030	2040	2050	2060
Collin	3,607	4,137	4,654	5,170	5,633	6,115
Cooke	273	306	335	364	389	421
Dallas	34,115	37,791	41,148	44,214	46,703	46,983
Denton	1,068	1,239	1,408	1,579	1,731	1,880
Ellis	3,466	3,670	3,841	3,987	4,089	3,912
Fannin	0	0	0	0	0	0
Freestone	0	0	0	0	0	0
Grayson	2	2	2	2	2	2
Henderson	110	118	133	151	172	195
Jack	0	0	0	0	0	0
Kaufman	760	813	869	928	993	1,061
Navarro	1,172	1,328	1,468	1,607	1,730	1,872
Parker	548	618	685	751	809	878
Rockwell	12	14	16	17	19	21
Tarrant	17,258	20,444	23,630	26,924	29,919	32,457
Wise	2,313	2,660	2,979	3,277	3,539	3,858
Total	64,704	73,140	81,168	88,971	95,728	99,655

2.3 Recommended Region C Reuse Projects

Currently, direct and indirect reuse projects account for nearly 100,000 acre-feet/year of existing supply in Region C. According to 2006 Region C Water Plan, the proposed future adoption of reuse is anticipated to provide approximately 771,000 acre-feet per year of water to meet demand in Region C by 2060. The total amount of reuse recommended in the plan is approximately 795,500 acre-ft per year. Two types of reuse projects are recommended in the 2006 Region C Water Plan, direct and indirect reuse.

2.3.1 Direct Reuse Projects

The majority of the existing reuse projects identified in the 2006 Region C Water Plan are direct reuse projects. Direct reuse projects typically supply water for landscape irrigation (golf courses) and industrial uses (cooling water for electric power plants) by delivering treated wastewater effluent directly from a wastewater treatment facility. Direct reuse projects require notification of the Texas Commission on Environmental Quality (TCEQ) and must comply with direct reuse regulations in Title 30, Chapter 210 of the Texas Administrative Code. Recommended direct reuse projects included in the 2006 Region C Water Plan are listed below.

Table 4 Region C Recommended Direct Reuse Projects

Values in Acre-feet per Year

Reuse Project	2010	2020	2030	2040	2050	2060
NTMWD East Fork Reuse	81,400	96,400	102,000	102,000	102,000	102,000
TRA Tarrant County Reuse (Tarrant County-Other)	0	7,500	7,500	7,500	7,500	7,500

Reuse Project	2010	2020	2030	2040	2050	2060
TRA Mountain Creek Direct Reuse SEP (Dallas County)	0	3,000	3,000	3,000	3,000	3,000
TRA Ellis County Direct Reuse SEP	20,000	20,000	30,000	30,000	40,000	40,000
TRA Direct Reuse for County Irrigation	3,750	3,750	3,750	3,750	3,750	3,750
TRA Direct Reuse for Denton County Irrigation	3,750	3,750	3,750	3,750	3,750	3,750
TRA Freestone County Direct Reuse SEP	0	0	10,000	10,000	20,000	20,000
TRA Kaufman County Direct Reuse SEP	0	7,500	15,000	15,000	15,000	15,000
Fort Worth Direct Reuse from Village Creek WWTP	500	500	1,100	2,000	2,600	2,600
Fort Worth Direct Reuse Mary's Creek	0	1,240	1,570	1,570	1,570	1,570
Fort Worth Direct Reuse Central Business District	0	2,240	3,360	3,360	3,360	3,360
Fort Worth Direct Reuse - Alliance Corridor	0	1,120	2,240	3,360	3,360	3,360
Bridgeport Direct Reuse	0	0	0	1,500	2,000	2,000
Decatur Direct Reuse	0	0	0	2,000	2,000	2,000
Local Mining Reuse	14,337	14,133	22,428	19,652	24,648	28,520
Total	**123,737**	**161,133**	**205,698**	**208,442**	**234,538**	**238,410**

2.3.2 Indirect Reuse Projects

Indirect reuse involves the discharge of treated wastewater into a stream or reservoir and subsequent diversion for reuse. The process allows the treated wastewater effluent to “blend” with the “natural” waters of the stream or reservoir prior to being diverted for use. In Region H many sources rely on the return flows from treated wastewater effluent as well as naturally occurring runoff. Recommended indirect reuse projects included in the 2006 Region C Water Plan are listed below.

Table 5 Region C Recommended Indirect Reuse Projects

Values in Acre-feet per Year

Reuse Project	2010	2020	2030	2040	2050	2060
NTMWD Additional Wilson Creek Indirect Reuse	26,956	35,941	35,941	35,941	35,941	35,941
DWU Direct Reuse	20,456	20,456	20,456	20,456	20,456	20,456
DWU Southside Indirect Reuse	0	67,253	67,253	67,253	67,253	67,253
DWU Lewisville Indirect Reuse	0	0	67,253	67,253	67,253	67,253
DWU and UTRWD Indirect Reuse of Return Flows above Dallas Lakes	34,366	44,746	53,141	60,640	69,854	79,605
TRWD Trinity River Reuse (Richland-Chambers)	63,000	63,000	63,000	63,000	63,000	63,000
TRWD Trinity River Reuse (Cedar Creek)	0	52,500	52,500	52,500	52,500	52,500
TRWD Additional Yield from Richland-Chambers due to reuse	21,556	28,612	35,668	37,465	37,465	37,465

Reuse Project	2010	2020	2030	2040	2050	2060
project						
TRWD Additional Yield from Cedar Creek due to reuse project	0	24,934	27,651	30,368	33,085	35,800
TRA Joe Pool Lake Indirect Reuse	0	20,000	20,000	20,000	20,000	20,000
TRA Joe Pool Lake Indirect Reuse	0	3,500	3,500	3,500	3,500	3,500
UTRWD Indirect Reuse of Chapman Lake	8,441	8,301	8,161	8,021	7,882	7,743
Athens Indirect Reuse	1,662	1,966	2,325	2,677	2,677	2,677
Ennis Indirect Reuse	0	0	74	1,037	2,269	3,696
TRA Additional Las Colinas Indirect Reuse		7,000	7,000	7,000	7,000	7,000
Gainesville Indirect	0	561	561	561	561	561
TRA Contract With Irving	28,000	28,000	28,000	28,000	28,000	28,000
Waxahachie Additional Reuse	3,112	2,963	2,684	2,405	2,125	1,846
UTRWD Indirect Reuse of flows from Lake Ralph Hall		17,760	17,760	17,760	17,760	17,760
Weatherford Indirect Reuse		5,000	5,000	5,000	5,000	5,000
Total	207,549	432,493	517,928	530,837	543,581	557,056

2.4 Projected Return Flows

As part of the 2011 Region H Water Plan, the potential impact of Region C recommended reuse strategies on return flows in the Trinity Basin were evaluated. The projected water demands, return flows and reuse strategies from the upper Trinity Basin were analyzed to determine the level of return flows available to Region H in the lower Trinity Basin.

The 2006 Region C Water Plan estimated the level of projected future return flows estimated based on projected municipal and industrial (M&I) water demands after the implementation of conservation measures. Return flow factors were determined from historical data (69 % for the Metroplex and 50% for other counties). Recommended direct reuse projects were subtracted from the projected return flows to determine the net return flows available to the upper Trinity Basin. *Table 6* presents the summary of projected return flow calculations presented in the Region C 2006 Water Plan. This number represents net return flows across the upper Trinity Basin.

Table 6 Region C 2006 Projected Upper Trinity Basin Return Flows

Values in Acre-feet per Year

	2010	2020	2030	2040	2050	2060
Demands	1,563,725	1,858,601	2,092,965	2,328,370	2,607,058	2,943,509
Conservation	51,370	106,427	148,159	188,500	230,232	277,434
Net Demands	1,512,355	1,752,174	1,944,806	2,139,870	2,376,826	2,666,075
Projected Return Flows	1,022,392	1,181,415	1,307,898	1,437,611	1,595,689	1,789,184
Proposed Reuse	372,112	601,685	724,073	743,867	780,471	796,279
Net Return Flows	650,280	579,730	583,825	693,744	815,218	992,905

Note: Projected Return Flows are based on (M&I) Water Use in the Trinity Basin in Region C.

The return flow analysis presented in the 2006 Region C Regional Water Plan resulted in a minimum net annual return flow estimate of 579,730 acre-ft per year in the 2020 planning decade. However, this estimate was based largely on an assumed return flow factor of 69% from water demands in the Metroplex. The 69% return flow factor was assumed from the TCEQ WAM Run 8 model and may not accurately reflect the return flow estimates during drought conditions. In December 2008, the draft Region C Water Conservation and Reuse Study was prepared by the Region C consultant team. As part of the study, projected return flows were re-analyzed using a reduced return flow factor reflecting severe drought conditions experienced in 2006. The revised return flow estimate assumed a return flow factor of 51% in 2010 and 2020, 52% in 2030 and 2040, and 53% in 2050 and 2060. The reduced return flow factors presented in the Region C Conservation and Reuse Study suggest a more consumptive use of existing water supplies than previously estimated. *Table 7* shows the revised return flow estimates based on information presented in the 2008 Draft Region C Water Conservation and Reuse Strategy.

Table 7 Region C 2008 Projected Upper Trinity Basin Return Flows

Values in Acre-feet per Year

	2010	2020	2030	2040	2050	2060
Demands	1,563,725	1,858,601	2,092,965	2,328,370	2,607,058	2,943,509
Conservation	51,370	106,427	148,159	188,500	230,232	277,434
Net Demands	1,512,355	1,752,174	1,944,806	2,139,870	2,376,826	2,666,075
Projected Return Flows	765,662	896,882	1,004,341	1,115,359	1,247,968	1,404,851
Proposed Reuse	350,476	613,996	751,286	781,515	817,876	832,360
Net Return Flows	415,185	282,886	253,055	333,844	430,092	572,491

Note: Projected Return Flows are based on M&I Water Use in the Trinity Basin in Region C.

As can be seen in *Table 7*, the projected return flows are reduced significantly from previous estimates as a result of the revised return flow factors. The minimum annual return flow estimated in the 2008 draft Region C report is 253,055 acre-ft per year in the year 2030. This estimate represents an almost 50% reduction from the previously estimated minimum annual return flow of 579,730 acre-ft per year in the year 2020.

Region C projected demands and reuse strategies downloaded from DB07 were analyzed assuming a reduced return flow factor of 50% in lieu of 69% as assumed in the Region C 2006 Plan. As can be seen in *Table 8*, the resulting net in-basin return flows are consistent with the results of the 2008 Region C Conservation and Reuse Study. There are some discrepancies. The total demands for Municipal and Manufacturing (M&I) WUGS in the Trinity Basin inside of Region C were higher in DB07 than shown in the 2008 Region C Water Conservation and Reuse Study. The WUG demands from DB07 were sorted by region and by basin to only include the WUGs located within the Trinity Basin and Region C. This may include several WUGs located in the Trinity Basin that discharge wastewater outside of the Trinity Basin.

Table 8 DB07 Return Flow Analysis

Values in Acre-feet per Year

	2010	2020	2030	2040	2050	2060
Demands	1,596,099	1,923,710	2,188,421	2,453,800	2,757,833	3,114,920
Conservation	52,095	110,803	154,475	196,101	238,662	286,681
Net Demands	1,544,004	1,812,907	2,033,946	2,257,699	2,519,171	2,828,239
Return Flows	772,002	906,454	1,016,973	1,128,850	1,259,586	1,414,120
Proposed Reuse	381,657	627,507	761,415	774,472	812,259	826,588
Net Return Flows	390,345	278,947	255,558	354,378	447,327	587,532

Note: Projected Return Flows are based on M&I Water Use in the Trinity Basin in Region C.

2.5 Simulated Return Flows

The projected return flows available to Region H were analyzed at the Oakwood Gage location marking the boundary between Region C and Region H. To model the projected return flows, several models were obtained from the Region C consultant to accurately model the net in-basin return flows associated with projected upper basin demands and projected strategies. The models were developed by the Region C Consultant team for the decades 2010, 2020, 2040 and 2060 to analyze projected return flows at the Oakwood gage. The results of the revised return flow projections were summarized in the 2008 Region C Conservation and Reuse Study. After performing a desktop analysis of Region C WUG demands and proposed reuse strategies downloaded from DB07, it was decided to adopt the return flow estimates projected in the 2008 Region C Water Conservation and Reuse Study for the analysis. The return flows projected in 2008 by the Region C consultant presents the most conservative estimation of future return flows with a minimum annual in-basin return flow of approximately 253,000 acre-ft per year in 2030. In March 2009, the Region H consultant team received the future condition WAM Models from the Region C consultants for use in evaluating the impacts projected return flows on water availability in Region H, specifically the yield of Lake Livingston.

The Water Rights Analysis Package (WRAP) WAM Run 3 was updated to include the projected Region C reuse strategies and in-basin return flows. The models were then used to quantify the return flows available to Region H. The return flows available to region H during the drought of record were quantified as the increase in regulated flow above the WAM Run3 baseline conditions. *Figure 2-1* and *Table 9* illustrate that not all of the net in-basin return flows projected in Region C will be available to Region H. The return flows will also be available to other water right holders for diversion and impoundment in upstream reservoirs.

Figure 2-1 Minimum Annual Return Flows at Oakwood Gage

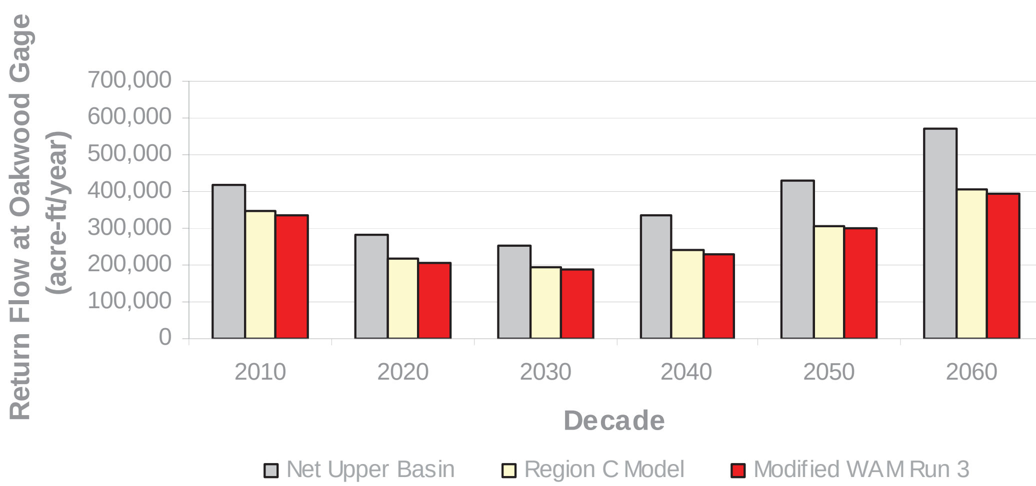


Table 9 Return Flows at Oakwood Gage

Values in Acre-feet per Year

Return Flows	2010	2020	2030	2040	2050	2060
Net Upper Basin	415,185	282,886	253,055	333,844	430,092	572,491
at Oakwood Gage	333,966	208,601	185,502	227,847	299,417	393,808
% of Net Upper Basin Return Flows	80.4%	73.7%	73.3%	68.2%	69.6%	68.8%

Section 3 – Methodology

Two sets of models were created and executed to evaluate the firm yield of the Lake Livingston water rights. The first set of models was updated to include the projected upper basin return flows from Region C for each decade as modeled for the Region C Water Conservation and Reuse Study. These models were used to evaluate the firm yield of Lake Livingston in each decade. The second set of models was updated to quantify the minimum level of return flows necessary to firm up the Lake Livingston water rights. Return flows were iteratively added to these models until the full permitted yield of the reservoir was firm during drought of record conditions. The models were executed to evaluate the firm yield of Lake Livingston with projected return flows from Region C and to determine the minimum level of return flows required in each planning decade. The results were also compared to quantify the excess or shortage of return flows projected in each planning decade.

3.1 Trinity River WAM Firm Yield Analysis

The firm yield of the Lake Livingston water rights was evaluated using a modified version of the TCEQ WAM Run3. The WAM Run 3 presents the most conservative set of assumptions when evaluating water right availability by assuming full authorized diversions and complete consumption (no return flows) unless otherwise specified within the water rights permit. To simulate actual projected conditions, the model was revised to include anticipated return flows and planned reuse identified in the Region C 2008 Water Conservation and Reuse Study. The model was also revised to include future storage area vs storage volume (SA/SV) curves to account for the effects of projected sedimentation on reservoir yields. The year 2000 SA/SV records were inserted into the model to simulate the 2010 scenario. Decade 2030 SA/SV records were inserted to model the decades 2020, 2030, and 2040. Model simulations for decades 2050 and 2060 assumed the year 2060 sedimentation condition. Table 10 lists the WAM Run 3 models and assumptions utilized in the analysis.

"Planning groups should analyze existing surface water supplies based on firm yield for both reservoirs and surface water diversions. For reservoirs, firm yield is the maximum amount of water a reservoir can provide in a given year during drought of record conditions using reasonable sedimentation rates, and under the assumption that senior water rights holders have their full allotments of water." General Guidelines for Regional Water Plan Development (2007 – 2012), March 2008.

Table 10 Lake Livingston Firm Yield Models

with Anticipated Return Flows and Planned Reuse

Model	Net Upper Basin Return Flows (acre ft/year)	Lake Livingston SA/SV Curve
TR_RUN3FY_2010.dat	415,815	Year 2000
TR_RUN3FY_2020.dat	282,886	Year 2030
TR_RUN3FY_2030.dat	253,055	Year 2030
TR_RUN3FY_2040.dat	333,844	Year 2030
TR_RUN3FY_2050.dat	430,092	Year 2060
TR_RUN3FY_2060.dat	572,491	Year 2060

3.2 Trinity River WAM Iterative Firm Yield Analysis

The effects of return flows on the firm yield of the Lake Livingston water rights were simulated by iteratively adjusting the magnitude of return flow available at the boundary between Region C and Region H. Return flows from the upper basin were modeled with a Constant Inflow (CI) record inserted at control point (CP) 8TROA, located at the boundary of Region H and Region C. The CI record assumed a constant monthly distribution. The annual volume of the assumed return flows was increased until the full permitted yield of the Lake Livingston water rights was available during the drought of record.

As discussed in *Section 3.1*, the storage area capacity curve for Lake Livingston was updated to account for the effects of projected sedimentation in future decades. The year 2000 SA/SV records were inserted into the model to simulate the 2010 scenario. Decade 2030 SA/SV records were inserted to model the decades 2020, 2030, and 2040. Model simulations for decades 2050 and 2060 assumed the year 2060 sedimentation condition. *Table 11* lists the WAM Run 3 models and assumptions utilized in the analysis.

Table 11 Lake Livingston Firm Yield

Model	Net Upper Basin Return Flows (acre ft/year)	Lake Livingston SA/SV Curve
TR_8TROA_2010.dat	280,000	Year 2000
TR_8TROA _2020.dat	280,000	Year 2030
TR_8TROA _2030.dat	280,000	Year 2030
TR_8TROA _2040.dat	280,000	Year 2030
TR_8TROA _2050.dat	285,000	Year 2060
TR_8TROA _2060.dat	285,000	Year 2060

Section 4 – Evaluation of Projected Return Flow on Lake Livingston

The impacts of projected upper basin return flows on the firm yield of Lake Livingston were analyzed for each decade in the planning period. The results are summarized in *Section 4.1*. The necessary level of return flows required to make the Lake Livingston water rights permit achieve 100% reliability was quantified for each decade in the planning period. The results are discussed in *Section 4.2*.

4.1 Lake Livingston Firm Yield

The firm yield of Lake Livingston is reduced in the decades 2020, 2030 and 2040 due to insufficient return flows from the upper Trinity Basin. *Table 12* lists the firm yield of Lake Livingston for each of the planning decades studied. By 2020, increased reuse diversions in Region C are projected to reduce return flows available to Region H and consequently to reduce the firm yield of Lake Livingston during a drought-of-record by 55,000 acre-ft per year. By 2030, projected in-basin return flows are projected to be reduced to 253,055 acre-ft per year, which is the minimum level expected during the planning period. Under these assumed conditions, the firm yield of Lake Livingston in 2030 is projected to be 1,265,000 acre-ft per year, approximately 79,000 acre-ft per year less than the currently permitted diversion under the existing water rights permit.

Return flows in the upper Trinity Basin are expected in increase from the year 2030 through 2060. In 2040 the firm yield of Lake Livingston is projected to increase to 1,294,000 acre-ft per year. The increase in firm yield is due to increased demands in the upper basin that will require the importation of additional out-of-basin supplies. By 2050, the firm yield of Lake Livingston is projected to be equal to the full permitted diversion. *Table 12* shows the projected firm yield of the Lake Livingston water rights under these assumed conditions.

Table 12 Lake Livingston Firm Yield (acre-ft per year)

Return Flows	2010	2020	2030	2040	2050	2060
Firm Yield	1,344,000	1,289,000	1,265,000	1,294,000	1,344,000	1,344,000
Reduction in Yield	0	-55,000	-79,000	-50,000	0	0

4.2 Necessary Level of Return Flows

The level of return flows required to achieve 100% reliability during the drought-of-record for the permitted diversion of the Lake Livingston water rights was determined by an iterative analysis. Return flows were artificially added to the TCEQ WAM Run 3 model and the analysis was performed for each decade in the planning period.

The results of the analysis are shown graphically in *Figure 4-1* by recording Lake Livingston storage volumes at the end of each month during the simulation. The baseline model shown in gray illustrates the storage volume of Lake Livingston assuming no return flows from the upper Trinity Basin. As can be seen from the graph, the firm yield of Lake Livingston is dependant on return flows. By adding return flows into the model, Lake Livingston is able to impound additional water during the drought of record. In *Figure 4-1* the additional water impounded in the Lake is represented by increasing storage volumes. As return flows are increased, the minimum lake levels between April 1956 and April 1957 are decreased until the permitted diversion is met during the drought of record.

Figure 4-2 compares the results of the iterative return flow analysis with the return flows projected at the Oakwood Gage for each decade in the planning period. The figure shows that a minimum of 280,000 acre-ft per year is required from 2010 to 2040 to achieve 100% reliability for the Lake Livingston water rights. This minimum required level of return flow increases in 2050 and 2060 to 285,000 acre-ft per year to offset reduced storage from sedimentation. The figure shows that in 2010 a sufficient volume of return flow is available to “firm up” the Lake Livingston permitted diversions. In the decades 2020, 2030, and 2040, however, the projected return flows are insufficient to maintain the full yield of the water rights. In 2050 and 2060, return flow levels are projected to increase to levels that will support the full permitted diversion of the Lake Livingston water rights.

Figure 4-1 Lake Livingston Storage

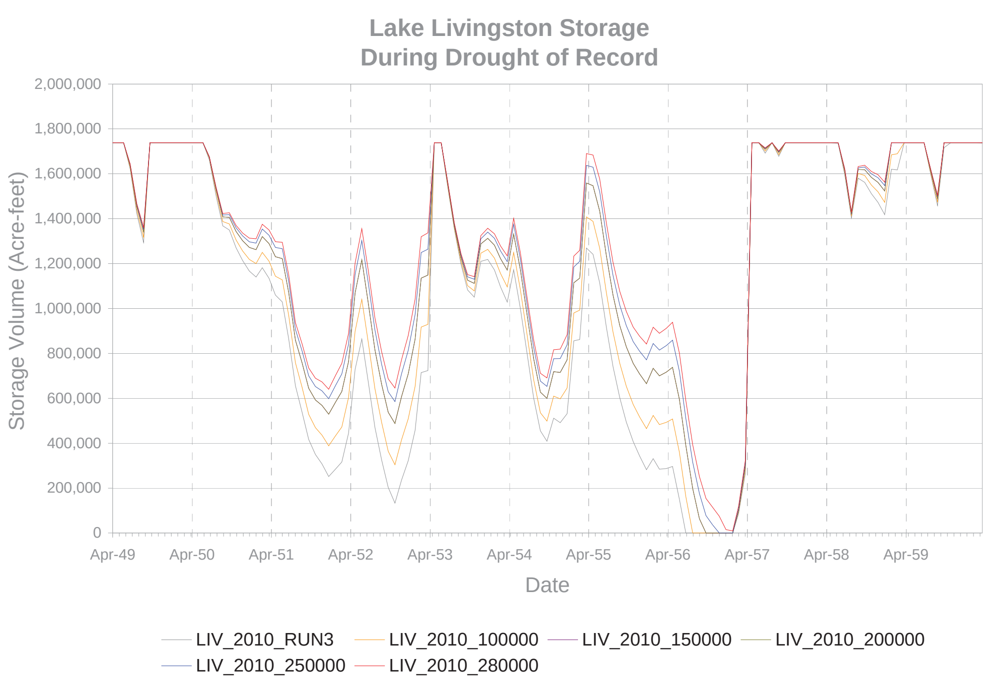
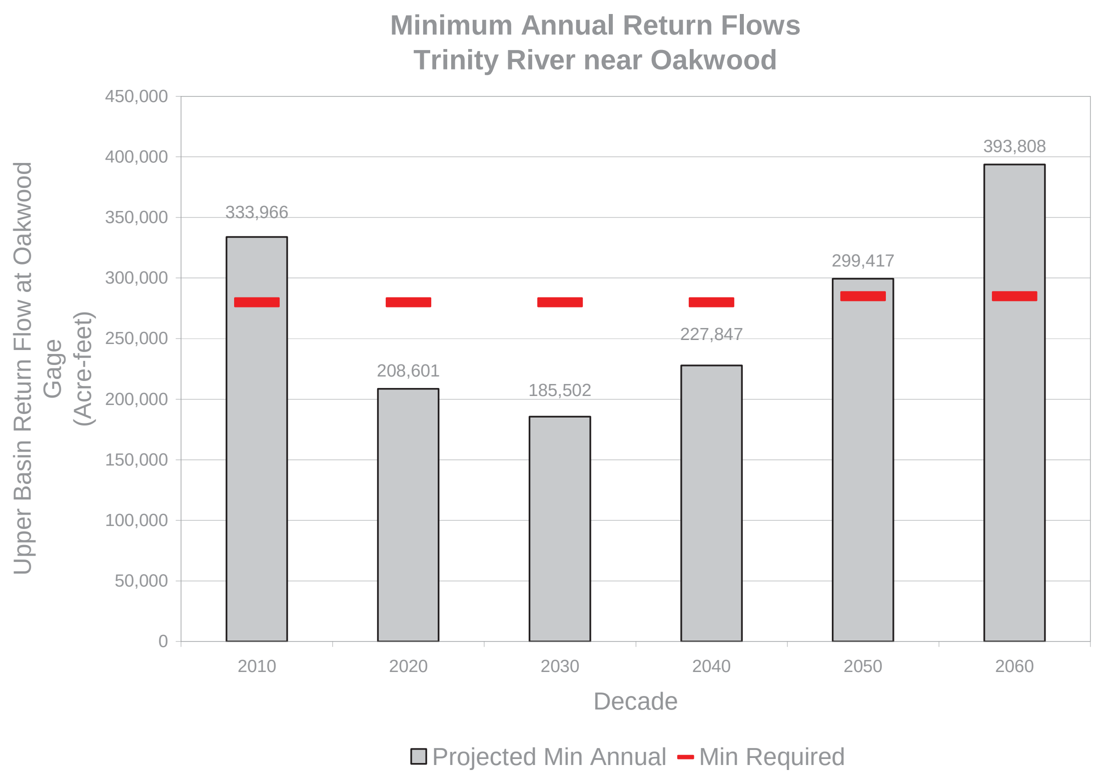


Figure 4-2 Minimum Annual Flows at Oakwood



This Page

Intentionally Left Blank

Section 5 – Findings and Conclusions

5.1 Summary of Findings

The results of this study consider conservative assumptions regarding the availability of return flows from Region C including full projected reuse and more consumptive use of existing and future water supplies. The reduction in projected return flows available to Region H are the result of a revision to the return flow factors used to estimate the amount of water returned in the upper Trinity Basin. The lower return flow factor indicates that demands in the upper basin are more consumptive than previously estimated, producing less net return flow to the basin. More consumptive use of water supplies in the upper Trinity Basin will reduce the amount of return flows available to Region H and will reduce the reliability of surface water rights in the lower Trinity Basin. The study shows that the firm yield of the Lake Livingston water rights may be temporarily reduced during the 2020, 2030 and 2040 decades as a result of these conservative return flow estimates from the upper Trinity Basin. By the year 2050 however, the projected return flows should be sufficient to maintain the full permitted diversion of the Lake Livingston water rights during the drought-of-record.

The firm yield of the Lake Livingston water rights was estimated for every decade in the planning period to evaluate the impacts of projected return flows from the upper Trinity Basin. The following statements describe whether sufficient return flows will be available to make the permitted yield of the Lake Livingston water rights 100% reliable during drought-of-record conditions. If sufficient return flows are not projected to be present, the reduction in the firm yield is listed.

- Sufficient return flows will be present in 2010.
- The firm yield of Lake Livingston will be reduced by 55,000 acre-ft per year in 2020.
- The firm yield of Lake Livingston will be reduced by 79,000 acre-ft per year in 2030.
- The firm yield of Lake Livingston will be reduced by 50,000 acre-ft per year in 2040.
- Sufficient return flows will be present in 2050.
- Sufficient return flows will be present in 2060.

The minimum level of return flows required to make the permitted yield of the Lake Livingston water rights 100% reliable during drought-of-record is approximately:

- 280,000 acre-ft per year required in 2010 – 2040 to maintain permitted diversions.
- 280,500 acre-ft per year required in 2050 and 2060.

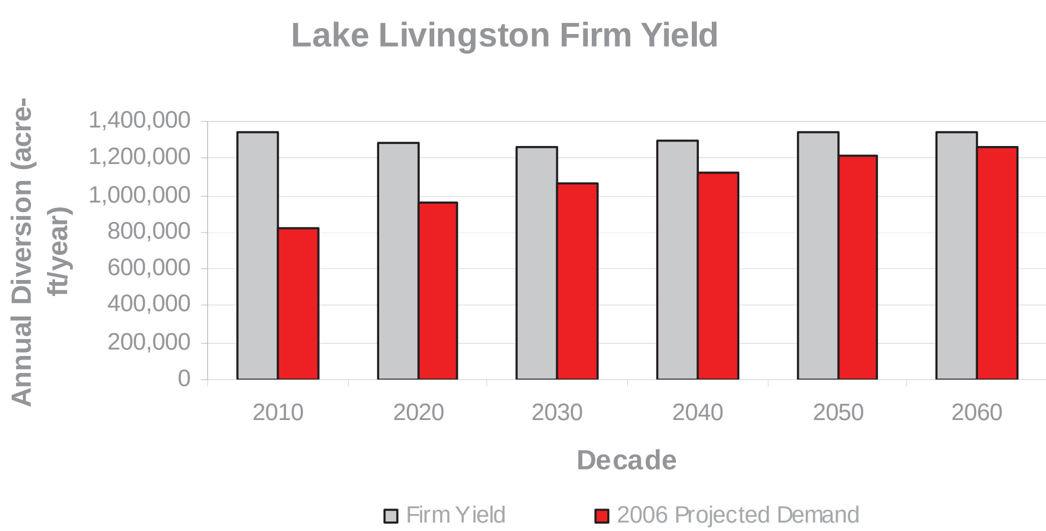
5.2 Impacts on Recommended Region H Strategies

The 2006 Region H Water Plan recommended several water management strategies that relied on utilizing water supplies from Lake Livingston. During the decades 2020, 2030, and 2040, the firm yield of the Lake Livingston water rights is projected to be reduced which could possibly impact these proposed water management strategies. Although the firm yield of the Lake Livingston water rights is projected to be reduced, sufficient supplies are projected to be available in Lake Livingston resulting in no impact to the water management strategies proposed in the 2006 Region H Plan. The firm yield of the Lake Livingston water rights and the Region H demands projected to be supplied by the source are summarized below in *Table 13* and illustrated in *Figure 5-1.*

Table 13 Lake Livingston Firm Yield vs Projected Demands (acre-ft per year)

	2010	2020	2030	2040	2050	2060
Firm Yield	1,344,000	1,289,000	1,265,000	1,294,000	1,344,000	1,344,000
Projected Demands	820,020	966,102	1,068,845	1,120,753	1,215,812	1,258,245
Surplus	523,980	322,898	196,155	173,247	128,188	85,755

Figure 5-1 Lake Livingston Firm Yield vs Projected Demands



Appendix A

DB07 – Region C Municipal Demands in Trinity Basin

This Page

Intentionally Left Blank

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
034001000	ABLE SPRINGS WSC	KAUFMAN	TRINITY	539	841	1,069	1,321	1,634	2,022
030673000	ADDISON	DALLAS	TRINITY	8,932	10,235	11,145	11,778	12,220	12,528
030674000	ALEDO	PARKER	TRINITY	454	622	793	943	1,105	1,284
030008000	ALLEN	COLLIN	TRINITY	24,150	29,603	34,845	36,584	37,321	37,632
030810000	ALVORD	WISE	TRINITY	178	196	215	233	253	277
030813000	ANNA	COLLIN	TRINITY	1,317	2,688	4,033	5,377	7,169	11,201
030814000	ANNETTA	PARKER	TRINITY	203	254	295	330	368	409
030997000	ANNETTA SOUTH	PARKER	TRINITY	91	108	121	132	145	158
030677000	ARGYLE	DENTON	TRINITY	2,380	4,011	5,035	5,562	6,144	6,721
034007000	ARGYLE WSC	DENTON	TRINITY	862	863	863	863	863	863
030025000	ARLINGTON	TARRANT	TRINITY	81,692	95,026	101,591	104,733	106,828	107,875
030028000	ATHENS	HENDERSON	TRINITY	2,737	3,276	3,930	4,724	5,678	6,822
030758000	AUBREY	DENTON	TRINITY	481	903	1,471	1,977	2,657	3,571
030816000	AURORA	WISE	TRINITY	142	168	193	218	246	279
030031000	AZLE	PARKER	TRINITY	366	466	580	678	781	895
030031000	AZLE	TARRANT	TRINITY	1,655	2,337	3,338	4,506	5,675	6,676
030033000	BALCH SPRINGS	DALLAS	TRINITY	2,716	2,907	3,072	3,216	3,340	3,448
030999000	BARDWELL	ELLIS	TRINITY	108	138	168	199	234	271
030820000	BARTONVILLE	DENTON	TRINITY	1,008	2,240	3,136	3,696	3,921	4,033
034010000	BARTONVILLE WSC	DENTON	TRINITY	317	363	404	441	474	503
030044000	BEDFORD	TARRANT	TRINITY	10,418	10,916	11,336	11,688	11,984	12,233
030051000	BENBROOK	TARRANT	TRINITY	4,963	5,909	7,091	8,509	10,163	12,054
034016000	BETHEL-ASH WSC	HENDERSON	TRINITY	175	213	252	291	339	399
034017000	BETHESDA WSC	TARRANT	TRINITY	1,589	1,968	2,358	2,769	3,262	3,846
034024000	BLACKLAND WSC	ROCKWALL	TRINITY	151	223	273	328	392	467
030828000	BLOOMING GROVE	NAVARRO	TRINITY	152	152	152	152	152	152
030062000	BLUE MOUND	TARRANT	TRINITY	308	322	322	322	322	322
030829000	BLUE RIDGE	COLLIN	TRINITY	314	672	1,176	1,848	2,688	3,024
034028000	BOLIVAR WSC	COOKE	TRINITY	215	260	311	312	312	312
034028000	BOLIVAR WSC	DENTON	TRINITY	928	1,301	3,024	6,721	10,921	14,786
034028000	BOLIVAR WSC	WISE	TRINITY	196	254	329	482	670	1,005
030760000	BOYD	WISE	TRINITY	222	296	325	325	325	325
034029000	BRANDON-IRENE WSC	ELLIS	TRINITY	10	11	13	14	15	17
034029000	BRANDON-IRENE WSC	NAVARRO	TRINITY	28	30	32	35	38	42
030076000	BRIDGEPORT	WISE	TRINITY	1,616	1,983	2,850	3,395	3,956	4,734
034040000	BUENA VISTA - BETHEL SUD	ELLIS	TRINITY	569	702	769	875	1,006	1,159
030087000	BURLESON	TARRANT	TRINITY	821	1,045	1,275	1,518	1,810	2,154
034041000	CADDO BASIN SUD	COLLIN	TRINITY	192	239	298	358	420	487
030098000	CARROLLTON	DALLAS	TRINITY	11,087	11,197	11,373	11,487	11,603	11,724
030098000	CARROLLTON	DENTON	TRINITY	15,478	16,027	16,839	17,344	17,696	17,871
030102000	CEDAR HILL	DALLAS	TRINITY	8,229	10,521	12,445	14,061	15,416	16,554
030102000	CEDAR HILL	ELLIS	TRINITY	9	9	9	9	9	9

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030103000	CELINA	COLLIN	TRINITY	1,008	5,080	10,753	19,042	29,124	33,604
034049000	CHATFIELD WSC	NAVARRO	TRINITY	562	864	1,055	1,262	1,509	1,813
030842000	CHICO	WISE	TRINITY	216	249	298	365	448	547
030121000	COCKRELL HILL	DALLAS	TRINITY	670	720	732	738	741	742
034065000	COLLEGE MOUND WSC	KAUFMAN	TRINITY	944	1,461	2,013	2,381	2,837	3,403
030125000	COLLEYVILLE	TARRANT	TRINITY	8,799	9,697	10,063	10,213	10,275	10,299
030765000	COLLINSVILLE	GRAYSON	TRINITY	335	467	599	730	862	994
030766000	COMBINE	DALLAS	TRINITY	104	135	150	166	186	212
030766000	COMBINE	KAUFMAN	TRINITY	191	247	297	352	420	504
034066000	COMBINE WSC	DALLAS	TRINITY	164	237	271	305	350	409
034066000	COMBINE WSC	KAUFMAN	TRINITY	321	502	656	828	1,040	1,303
034068000	COMMUNITY WATER COMPANY	ELLIS	TRINITY	121	182	218	254	295	340
034068000	COMMUNITY WATER COMPANY	NAVARRO	TRINITY	111	168	209	262	327	409
034069000	COMMUNITY WSC	TARRANT	TRINITY	437	444	451	458	467	477
034069000	COMMUNITY WSC	WISE	TRINITY	18	18	18	18	19	19
030133000	COPPELL	DALLAS	TRINITY	10,171	10,171	10,171	10,171	10,171	10,171
030133000	COPPELL	DENTON	TRINITY	106	147	182	212	237	258
030849000	COPPER CANYON	DENTON	TRINITY	404	560	840	1,246	1,456	1,568
030691000	CORINTH	DENTON	TRINITY	3,824	4,800	5,548	6,304	6,754	7,092
030137000	CORSICANA	NAVARRO	TRINITY	5,950	6,215	6,491	6,790	7,148	7,587
030757043	COUNTY-OTHER	COLLIN	TRINITY	827	772	723	673	620	564
030757049	COUNTY-OTHER	COOKE	TRINITY	870	1,022	1,057	1,063	1,063	1,063
030757057	COUNTY-OTHER	DALLAS	TRINITY	190	147	114	88	69	53
030757061	COUNTY-OTHER	DENTON	TRINITY	7,412	9,402	11,320	13,096	14,825	16,605
030757070	COUNTY-OTHER	ELLIS	TRINITY	2,039	2,039	2,039	2,039	2,039	2,039
030757074	COUNTY-OTHER	FANNIN	TRINITY	182	181	178	173	168	161
030757081	COUNTY-OTHER	FREESTONE	TRINITY	1,078	1,127	1,152	1,159	1,159	1,159
030757091	COUNTY-OTHER	GRAYSON	TRINITY	451	449	443	421	388	347
030757107	COUNTY-OTHER	HENDERSON	TRINITY	268	268	267	267	267	267
030757119	COUNTY-OTHER	JACK	TRINITY	386	451	515	580	644	708
030757129	COUNTY-OTHER	KAUFMAN	TRINITY	1,837	1,837	1,837	1,837	1,837	1,837
030757175	COUNTY-OTHER	NAVARRO	TRINITY	256	256	256	256	256	256
030757184	COUNTY-OTHER	PARKER	TRINITY	2,576	2,319	2,061	1,803	1,546	1,288
030757199	COUNTY-OTHER	ROCKWALL	TRINITY	140	140	140	140	140	140
030757220	COUNTY-OTHER	TARRANT	TRINITY	3,535	3,535	3,535	3,535	3,535	3,535
030757249	COUNTY-OTHER	WISE	TRINITY	3,988	4,626	4,626	4,626	4,626	4,626
030767000	CRANDALL	KAUFMAN	TRINITY	759	1,063	1,351	1,669	2,064	2,553
031011000	CROSS ROADS	DENTON	TRINITY	588	1,310	2,134	3,560	5,545	6,922
030145000	CROWLEY	TARRANT	TRINITY	1,421	1,737	2,211	3,001	3,633	3,949
034083000	CULLEOKA WSC	COLLIN	TRINITY	956	1,451	1,762	2,082	2,416	2,771

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030151000	DALLAS	COLLIN	TRINITY	16,969	18,964	20,148	20,851	21,268	21,876
030151000	DALLAS	DALLAS	TRINITY	370,552	410,015	430,705	451,783	501,451	589,420
030151000	DALLAS	DENTON	TRINITY	7,900	8,492	8,787	8,934	9,007	9,043
030151000	DALLAS	ROCKWALL	TRINITY	6	6	6	6	6	6
034085000	DALLAS COUNTY WCID #6	DALLAS	TRINITY	609	829	959	1,089	1,258	1,483
030692000	DALWORTHINGTON GARDENS	TARRANT	TRINITY	782	840	878	903	920	930
034086000	DANVILLE WSC	COLLIN	TRINITY	870	1,203	1,497	1,798	2,114	2,450
030855000	DAWSON	NAVARRO	TRINITY	180	193	205	219	236	256
030161000	DE SOTO	DALLAS	TRINITY	10,942	13,465	15,490	17,379	19,506	20,089
030153000	DECATUR	WISE	TRINITY	1,669	2,087	2,879	3,742	4,845	5,697
030159000	DENTON	DENTON	TRINITY	30,698	42,130	52,927	62,454	76,974	105,533
034089000	DENTON COUNTY FWSD	DENTON	TRINITY	1,008	1,614	2,184	2,771	3,367	3,990
030768000	DOUBLE OAK	DENTON	TRINITY	690	764	813	863	912	961
030171000	DUNCANVILLE	DALLAS	TRINITY	8,104	8,529	8,734	8,930	9,116	9,293
034094000	EAST CEDAR CREEK FWSD	HENDERSON	TRINITY	2,381	2,987	3,586	4,200	4,949	5,894
034096000	EAST FORK SUD	COLLIN	TRINITY	577	751	904	1,062	1,226	1,401
034096000	EAST FORK SUD	DALLAS	TRINITY	120	126	130	134	139	145
034096000	EAST FORK SUD	ROCKWALL	TRINITY	9	9	9	9	9	9
030180000	EDGECLIFF	TARRANT	TRINITY	471	471	471	471	471	471
030192000	ENNIS	ELLIS	TRINITY	3,589	4,594	5,881	7,528	9,637	12,336
030193000	EULESS	TARRANT	TRINITY	9,998	11,302	11,945	12,262	12,418	12,496
030864000	EUSTACE	HENDERSON	TRINITY	153	169	184	200	219	243
030194000	EVERMAN	TARRANT	TRINITY	837	915	992	1,069	1,146	1,159
030196000	FAIRFIELD	FREESTONE	TRINITY	1,143	1,257	1,371	1,485	1,600	1,714
030772000	FAIRVIEW	COLLIN	TRINITY	1,752	2,353	3,038	4,557	7,595	13,291
030198000	FARMERS BRANCH	DALLAS	TRINITY	11,366	12,369	13,282	14,112	14,866	15,552
030199000	FARMERSVILLE	COLLIN	TRINITY	586	1,113	1,591	2,386	3,499	4,772
030201000	FERRIS	ELLIS	TRINITY	341	341	341	341	341	341
034112000	FILES VALLEY WSC	ELLIS	TRINITY	145	158	171	184	199	216
034114000	FLO COMMUNITY WSC	FREESTONE	TRINITY	21	22	23	23	23	23
030204000	FLOWER MOUND	DENTON	TRINITY	17,205	22,851	26,883	30,916	33,335	34,972
030206000	FOREST HILL	TARRANT	TRINITY	1,847	2,015	2,187	2,369	2,576	2,705
030207000	FORNEY	KAUFMAN	TRINITY	2,016	4,301	5,377	6,273	6,990	7,671
034115000	FORNEY LAKE WSC	KAUFMAN	TRINITY	2,285	2,464	2,576	2,688	2,800	2,912
034115000	FORNEY LAKE WSC	ROCKWALL	TRINITY	1,792	2,464	2,576	2,688	2,800	2,912
030213000	FORT WORTH	DENTON	TRINITY	1,204	7,225	10,837	15,654	22,879	30,104
030213000	FORT WORTH	PARKER	TRINITY	2,890	12,523	19,266	22,156	25,287	27,696
030213000	FORT WORTH	TARRANT	TRINITY	147,856	167,210	196,093	239,362	301,825	380,214
030213000	FORT WORTH	WISE	TRINITY	482	2,408	3,372	4,335	5,780	7,225

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030221000	FRISCO	COLLIN	TRINITY	30,244	48,726	52,423	56,119	59,816	62,000
030221000	FRISCO	DENTON	TRINITY	15,833	18,482	29,572	34,276	37,637	38,813
030868000	FROST	NAVARRO	TRINITY	89	96	103	110	118	129
030225000	GAINESVILLE	COOKE	TRINITY	3,811	4,149	4,610	5,020	5,430	5,942
030230000	GARLAND	DALLAS	TRINITY	44,227	47,987	51,186	54,009	56,455	56,455
034137000	GASTONIA-SCURRY	KAUFMAN	TRINITY	896	1,288	1,500	1,819	2,214	2,703
030697000	GLENN HEIGHTS	DALLAS	TRINITY	944	1,149	1,338	1,514	1,676	1,827
030697000	GLENN HEIGHTS	ELLIS	TRINITY	343	469	593	720	862	1,018
030245000	GRAND PRAIRIE	DALLAS	TRINITY	23,802	28,400	33,327	39,604	46,881	54,371
030245000	GRAND PRAIRIE	ELLIS	TRINITY	77	361	903	1,517	2,242	3,164
030245000	GRAND PRAIRIE	TARRANT	TRINITY	6,282	7,732	8,675	9,288	9,686	9,945
030249000	GRAPEVINE	TARRANT	TRINITY	13,805	16,249	17,590	18,552	19,244	19,740
030699000	GUN BARREL CITY	HENDERSON	TRINITY	1,284	1,508	1,729	1,956	2,232	2,581
030876000	GUNTER	GRAYSON	TRINITY	417	694	833	972	1,111	1,250
034146000	GUNTER RURAL WSC	COLLIN	TRINITY	580	773	909	1,092	1,284	1,489
034146000	GUNTER RURAL WSC	GRAYSON	TRINITY	103	155	206	283	451	644
031023000	HACKBERRY	DENTON	TRINITY	147	219	287	320	336	343
030261000	HALTOM CITY	TARRANT	TRINITY	7,336	8,230	8,677	8,901	9,013	9,069
030879000	HASLET	TARRANT	TRINITY	428	856	1,498	1,498	1,498	1,498
030702000	HEATH	ROCKWALL	TRINITY	1,796	2,650	3,323	4,048	4,903	5,906
030776000	HEBRON	DENTON	TRINITY	224	349	582	1,165	1,747	1,887
030704000	HICKORY CREEK	DENTON	TRINITY	557	891	1,092	1,344	1,764	2,268
034203000	HICKORY CREEK SUD	COLLIN	TRINITY	12	16	20	24	27	32
034203000	HICKORY CREEK SUD	FANNIN	TRINITY	13	15	16	16	17	18
034205000	HIGH POINT WSC	KAUFMAN	TRINITY	533	771	932	1,111	1,333	1,608
034205000	HIGH POINT WSC	ROCKWALL	TRINITY	51	82	102	124	149	179
030276000	HIGHLAND PARK	DALLAS	TRINITY	4,285	4,327	4,366	4,402	4,434	4,465
030706000	HIGHLAND VILLAGE	DENTON	TRINITY	3,478	3,873	4,102	4,234	4,310	4,363
030286000	HOWE	GRAYSON	TRINITY	502	840	1,143	1,344	1,512	1,680
030883000	HUDSON OAKS	PARKER	TRINITY	381	549	731	894	1,073	1,273
030293000	HURST	TARRANT	TRINITY	7,742	8,219	8,542	8,759	8,906	9,006
030294000	HUTCHINS	DALLAS	TRINITY	1,255	2,509	4,015	6,022	8,029	8,531
030298000	IRVING	DALLAS	TRINITY	56,483	61,857	65,916	68,982	71,296	73,044
030299000	ITALY	ELLIS	TRINITY	293	352	397	443	494	551
030302000	JACKSBORO	JACK	TRINITY	703	726	741	741	741	741
034216000	JOHNSON COUNTY RURAL SUD	ELLIS	TRINITY	43	57	73	91	110	129
034216000	JOHNSON COUNTY RURAL SUD	TARRANT	TRINITY	429	554	689	847	1,033	1,221
031031000	JOSEPHINE	COLLIN	TRINITY	103	302	302	302	302	302

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030784000	JUSTIN	DENTON	TRINITY	516	903	1,457	2,395	2,924	3,226
030313000	KAUFMAN	KAUFMAN	TRINITY	1,202	1,825	2,188	2,479	2,770	3,341
030315000	KELLER	TARRANT	TRINITY	9,341	11,152	11,152	11,152	11,152	11,152
030711000	KEMP	KAUFMAN	TRINITY	185	185	185	185	185	185
030318000	KENNEDALE	TARRANT	TRINITY	1,388	1,675	1,869	2,001	2,089	2,149
030712000	KERENS	NAVARRO	TRINITY	405	405	405	405	405	405
034223000	KIOWA HOMEOWNERS WSC	COOKE	TRINITY	514	551	571	574	573	573
030892000	KRUGERVILLE	DENTON	TRINITY	171	196	228	296	386	554
030785000	KRUM	DENTON	TRINITY	495	708	877	1,176	1,512	1,932
030337000	LAKE DALLAS	DENTON	TRINITY	1,257	1,529	1,669	1,765	1,832	1,878
030341000	LAKE WORTH	TARRANT	TRINITY	952	1,059	1,176	1,294	1,411	1,470
031036000	LAKESIDE	TARRANT	TRINITY	454	527	601	679	773	884
030345000	LANCASTER	DALLAS	TRINITY	7,953	12,725	15,906	19,087	21,632	23,223
034230000	LAVON WSC	COLLIN	TRINITY	383	616	902	1,803	2,834	3,864
034230000	LAVON WSC	ROCKWALL	TRINITY	348	616	804	1,007	1,245	1,525
030352000	LEONARD	FANNIN	TRINITY	308	358	499	785	1,142	1,427
030355000	LEWISVILLE	DALLAS	TRINITY	1	1	1	1	1	1
030355000	LEWISVILLE	DENTON	TRINITY	21,309	26,697	30,647	33,332	35,285	37,301
031018000	LINCOLN PARK	DENTON	TRINITY	138	208	264	322	381	442
030899000	LINDSAY	COOKE	TRINITY	157	168	174	175	175	175
030790000	LITTLE ELM	DENTON	TRINITY	5,565	8,513	10,104	10,104	10,104	10,104
031039000	LOG CABIN	HENDERSON	TRINITY	99	135	155	155	155	155
031041000	LOWRY CROSSING	COLLIN	TRINITY	322	413	494	576	663	2,505
030718000	LUCAS	COLLIN	TRINITY	1,075	1,655	2,016	2,604	3,696	5,041
034239000	LUELLA WSC	GRAYSON	TRINITY	506	569	613	638	654	743
034241000	M E N WSC	NAVARRO	TRINITY	456	501	551	597	635	690
030375000	MABANK	HENDERSON	TRINITY	76	82	87	93	99	108
030375000	MABANK	KAUFMAN	TRINITY	530	647	767	900	1,065	1,270
030383000	MALAKOFF	HENDERSON	TRINITY	431	457	483	509	542	582
030384000	MANSFIELD	ELLIS	TRINITY	124	278	484	755	1,116	1,589
030384000	MANSFIELD	TARRANT	TRINITY	13,442	19,603	25,203	30,804	34,164	34,164
030911000	MAYPEARL	ELLIS	TRINITY	147	147	147	147	147	147
030379000	MCKINNEY	COLLIN	TRINITY	25,134	41,231	60,241	81,835	97,595	112,014
031042000	MCLENDON-CHISHOLM	ROCKWALL	TRINITY	204	265	317	373	440	518
030914000	MELISSA	COLLIN	TRINITY	2,420	4,481	5,825	7,169	8,961	11,201
030401000	MESQUITE	DALLAS	TRINITY	29,572	36,041	41,585	44,727	46,021	46,317
030401000	MESQUITE	KAUFMAN	TRINITY	-	1	1	1	1	2

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030405000	MIDLOTHIAN	ELLIS	TRINITY	2,925	4,667	6,904	8,416	9,767	10,788
030916000	MILFORD	ELLIS	TRINITY	88	88	88	88	88	88
034257000	MILLIGAN WSC	COLLIN	TRINITY	209	209	209	209	209	209
034269000	MOUNTAIN PEAK WSC	ELLIS	TRINITY	1,244	1,396	1,481	1,710	2,102	2,609
034270000	MT ZION WSC	ROCKWALL	TRINITY	447	658	737	816	895	921
030418000	MUENSTER	COOKE	TRINITY	385	446	493	547	608	669
030724000	MURPHY	COLLIN	TRINITY	1,596	6,066	6,066	6,066	6,066	6,066
034271000	MUSTANG WSC	DENTON	TRINITY	958	1,552	2,041	2,544	3,055	3,590
034413000	NAVARRO MILLS WSC	NAVARRO	TRINITY	360	517	647	808	1,010	1,263
031045000	NEVADA	COLLIN	TRINITY	71	182	218	437	728	1,820
031047000	NEW FAIRVIEW	WISE	TRINITY	204	279	352	424	505	600
030923000	NEW HOPE	COLLIN	TRINITY	272	395	659	988	1,482	3,293
030920000	NEWARK	WISE	TRINITY	160	250	330	466	629	877
034278000	NORTH COLLIN WSC	COLLIN	TRINITY	904	1,167	1,399	1,638	1,887	2,153
030435000	NORTH RICHLAND HILLS	TARRANT	TRINITY	12,787	14,491	15,642	16,419	16,945	17,300
031020000	NORTHLAKE	DENTON	TRINITY	808	967	1,858	2,750	3,307	3,561
030928000	OAK GROVE	KAUFMAN	TRINITY	130	160	190	224	266	318
030929000	OAK LEAF	ELLIS	TRINITY	347	409	471	534	605	683
030930000	OAK POINT	DENTON	TRINITY	527	873	1,142	1,420	1,702	1,997
030729000	OVILLA	DALLAS	TRINITY	77	114	167	245	359	526
030729000	OVILLA	ELLIS	TRINITY	1,049	1,407	1,759	1,968	1,968	1,968
030731000	PALMER	ELLIS	TRINITY	248	266	283	301	322	344
030454000	PANTEGO	TARRANT	TRINITY	657	657	657	657	657	657
030733000	PARKER	COLLIN	TRINITY	1,943	4,237	6,219	10,106	14,770	20,212
030934000	PAYNE SPRINGS	HENDERSON	TRINITY	169	181	193	205	219	237
030935000	PECAN HILL	ELLIS	TRINITY	164	190	216	243	272	305
030795000	PELICAN BAY	TARRANT	TRINITY	164	217	277	306	341	382
030465000	PILOT POINT	DENTON	TRINITY	1,255	1,764	2,016	2,233	2,369	2,520
030472000	PLANO	COLLIN	TRINITY	72,283	74,938	77,848	80,746	83,643	86,541
030472000	PLANO	DENTON	TRINITY	1,578	2,220	2,243	2,257	2,272	2,286
031021000	PONDER	DENTON	TRINITY	643	1,787	3,573	5,717	6,611	6,789
030487000	PRINCETON	COLLIN	TRINITY	700	1,680	3,024	5,041	8,401	12,602
030799000	PROSPER	COLLIN	TRINITY	2,061	7,561	10,921	12,322	13,162	14,002
030799000	PROSPER	DENTON	TRINITY	515	2,240	3,921	5,881	6,441	7,001
034313000	R-C-H WSC	ROCKWALL	TRINITY	420	462	499	538	584	638
030737000	RED OAK	ELLIS	TRINITY	1,143	1,463	1,745	2,034	2,357	2,713
030739000	RENO	PARKER	TRINITY	331	345	356	366	376	387
030946000	RHOME	WISE	TRINITY	603	1,184	1,694	2,166	2,585	3,099
030947000	RICE	NAVARRO	TRINITY	233	274	317	364	420	488

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
034409000	RICE WSC	ELLIS	TRINITY	132	177	222	267	318	374
034409000	RICE WSC	NAVARRO	TRINITY	855	1,077	1,307	1,557	1,855	2,222
030498000	RICHARDSON	COLLIN	TRINITY	7,023	10,854	10,854	10,854	10,854	10,854
030498000	RICHARDSON	DALLAS	TRINITY	25,820	26,178	26,178	26,178	26,178	26,178
030499000	RICHLAND HILLS	TARRANT	TRINITY	1,355	1,452	1,548	1,661	1,726	1,750
030505000	RIVER OAKS	TARRANT	TRINITY	1,042	1,042	1,042	1,042	1,042	1,042
030800000	ROANOKE	DENTON	TRINITY	1,209	1,960	3,080	4,201	5,601	6,747
034325000	ROCKETT SUD	DALLAS	TRINITY	340	426	477	528	594	683
034325000	ROCKETT SUD	ELLIS	TRINITY	4,161	5,119	5,607	6,370	7,323	8,430
030513000	ROCKWALL	ROCKWALL	TRINITY	8,603	15,402	19,883	22,403	22,995	22,995
030521000	ROWLETT	DALLAS	TRINITY	10,997	14,152	16,238	17,925	19,291	20,397
030521000	ROWLETT	ROCKWALL	TRINITY	1,617	1,722	1,725	1,725	1,725	1,725
031059000	RUNAWAY BAY	WISE	TRINITY	329	405	478	550	632	726
030742000	SACHSE	COLLIN	TRINITY	741	1,212	1,404	1,485	1,520	1,546
030742000	SACHSE	DALLAS	TRINITY	2,350	2,953	3,446	3,894	4,301	4,670
030527000	SAGINAW	TARRANT	TRINITY	2,956	3,692	4,162	4,505	4,755	4,938
031072000	SAINT PAUL	COLLIN	TRINITY	198	496	991	1,586	1,884	1,983
030535000	SANGER	DENTON	TRINITY	2,333	2,950	3,518	4,195	4,704	4,901
030539000	SANSOM PARK VILLAGE	TARRANT	TRINITY	623	644	661	673	683	691
034330000	SARDIS-LONE ELM WSC	DALLAS	TRINITY	8	8	8	8	8	8
034330000	SARDIS-LONE ELM WSC	ELLIS	TRINITY	1,718	1,770	1,782	1,982	2,366	2,869
030547000	SEAGOVILLE	DALLAS	TRINITY	2,574	2,961	3,295	3,656	3,938	4,241
030547000	SEAGOVILLE	KAUFMAN	TRINITY	3	4	6	7	10	12
030959000	SEVEN POINTS	HENDERSON	TRINITY	181	217	252	288	333	389
030803000	SHADY SHORES	DENTON	TRINITY	320	464	566	671	777	888
034336000	SOUTH GRAYSON WSC	COLLIN	TRINITY	220	227	235	238	242	246
034336000	SOUTH GRAYSON WSC	GRAYSON	TRINITY	176	279	367	470	587	734
030570000	SOUTHLAKE	DENTON	TRINITY	336	672	1,008	1,344	1,949	2,016
030570000	SOUTHLAKE	TARRANT	TRINITY	11,620	13,960	15,168	15,792	16,114	16,280
034341000	SOUTHWEST FANNIN COUNTY SUD	FANNIN	TRINITY	5	8	9	10	10	11
030574000	SPRINGTOWN	PARKER	TRINITY	521	694	868	1,042	1,215	1,389
030749000	SUNNYVALE	DALLAS	TRINITY	1,815	2,540	3,266	3,992	4,718	4,827
031065000	TALTY	KAUFMAN	TRINITY	866	1,356	1,860	2,419	3,111	3,968
030596000	TEAGUE	FREESTONE	TRINITY	338	459	507	561	611	662
030599000	TERRELL	KAUFMAN	TRINITY	3,643	4,469	5,193	5,669	6,136	6,819
030752000	THE COLONY	DENTON	TRINITY	5,513	7,214	8,115	8,373	8,631	8,708
030974000	TIOGA	GRAYSON	TRINITY	196	445	623	712	784	819
030976000	TOM BEAN	GRAYSON	TRINITY	268	304	345	365	385	406
030753000	TOOL	HENDERSON	TRINITY	419	479	538	598	671	764

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
030978000	TRENTON	FANNIN	TRINITY	209	314	524	838	1,257	1,676
030609000	TRINIDAD	HENDERSON	TRINITY	188	192	196	200	205	211
030806000	TROPHY CLUB	DENTON	TRINITY	2,737	3,086	3,386	3,646	3,927	4,207
034367000	TWO WAY SUD	GRAYSON	TRINITY	207	301	368	438	509	579
030615000	UNIVERSITY PARK	DALLAS	TRINITY	7,394	7,565	7,687	7,776	7,840	7,886
030981000	VALLEY VIEW	COOKE	TRINITY	193	386	644	902	1,546	1,932
030619000	VAN ALSTYNE	GRAYSON	TRINITY	1,011	2,464	3,360	3,808	4,145	4,301
034371000	VIRGINIA HILL WSC	HENDERSON	TRINITY	403	405	407	409	412	415
034373000	WALNUT CREEK SUD	PARKER	TRINITY	2,128	2,753	3,258	3,695	4,160	4,669
034373000	WALNUT CREEK SUD	WISE	TRINITY	261	335	407	479	559	653
030632000	WATAUGA	TARRANT	TRINITY	3,542	3,725	3,871	3,987	4,080	4,154
030633000	WAXAHACHIE	ELLIS	TRINITY	6,589	8,435	10,797	13,821	17,693	22,648
030634000	WEATHERFORD	PARKER	TRINITY	5,108	6,464	7,696	8,690	9,757	10,952
034381000	WEST CEDAR CREEK MUD	HENDERSON	TRINITY	1,352	1,926	2,386	2,767	3,233	3,821
034381000	WEST CEDAR CREEK MUD	KAUFMAN	TRINITY	955	1,598	2,200	2,787	3,513	4,414
034391000	WEST WISE RURAL SUD	WISE	TRINITY	517	572	625	677	736	805
031069000	WESTON	COLLIN	TRINITY	269	717	1,568	4,481	7,841	13,442
031070000	WESTOVER HILLS	TARRANT	TRINITY	279	279	279	279	279	279
030644000	WESTWORTH VILLAGE	TARRANT	TRINITY	252	306	325	348	374	412
030651000	WHITE SETTLEMENT	TARRANT	TRINITY	2,584	2,780	3,026	3,107	3,353	3,598
030650000	WHITESBORO	GRAYSON	TRINITY	458	482	499	508	514	521
030756000	WILLOW PARK	PARKER	TRINITY	648	806	986	1,139	1,300	1,475
030657000	WILMER	DALLAS	TRINITY	678	966	1,134	1,353	1,803	2,834
034403000	WOODBINE WSC	COOKE	TRINITY	661	729	798	866	934	1,003
034403000	WOODBINE WSC	GRAYSON	TRINITY	13	14	14	14	14	14
030668000	WORTHAM	FREESTONE	TRINITY	251	262	268	270	270	270
030669000	WYLIE	COLLIN	TRINITY	6,804	10,782	13,442	18,818	19,715	21,544
030669000	WYLIE	DALLAS	TRINITY	117	185	235	279	319	355
030669000	WYLIE	ROCKWALL	TRINITY	136	234	306	383	474	504
Total				1,531,395	1,850,570	2,107,253	2,364,829	2,662,105	3,015,265

Appendix B

DB07 – Region C Industrial Demands in Trinity Basin

This Page

Intentionally Left Blank

Appendix B
DB07 – Region C Industrial Demands in Trinity Basin

WUG ID	WUG Name	WUG County Name	WUG Basin Name	TWD2010	TWD2020	TWD2030	TWD2040	TWD2050	TWD2060
031001043	MANUFACTURING	COLLIN	TRINITY	3,607	4,137	4,654	5,170	5,633	6,115
031001049	MANUFACTURING	COOKE	TRINITY	273	306	335	364	389	421
031001057	MANUFACTURING	DALLAS	TRINITY	34,115	37,791	41,148	44,214	46,703	46,983
031001061	MANUFACTURING	DENTON	TRINITY	1,068	1,239	1,408	1,579	1,731	1,880
031001070	MANUFACTURING	ELLIS	TRINITY	3,466	3,670	3,841	3,987	4,089	3,912
031001091	MANUFACTURING	GRAYSON	TRINITY	2	2	2	2	2	2
031001107	MANUFACTURING	HENDERSON	TRINITY	110	118	133	151	172	195
031001129	MANUFACTURING	KAUFMAN	TRINITY	760	813	869	928	993	1,061
031001175	MANUFACTURING	NAVARRO	TRINITY	1,172	1,328	1,468	1,607	1,730	1,872
031001184	MANUFACTURING	PARKER	TRINITY	548	618	685	751	809	878
031001199	MANUFACTURING	ROCKWALL	TRINITY	12	14	16	17	19	21
031001220	MANUFACTURING	TARRANT	TRINITY	17,258	20,444	23,630	26,924	29,919	32,457
031001249	MANUFACTURING	WISE	TRINITY	2,313	2,660	2,979	3,277	3,539	3,858
Total				64,704	73,140	81,168	88,971	95,728	99,655

Appendix C

DB07 – Region C Conservation Supply in Trinity Basin

This Page

Intentionally Left Blank

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001043	MANUFACTURING	COLLIN	TRINITY	-	6	72	108	119	130
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001049	MANUFACTURING	COOKE	TRINITY	-	1	7	10	11	12
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001057	MANUFACTURING	DALLAS	TRINITY	-	68	781	1,135	1,212	1,258
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001061	MANUFACTURING	DENTON	TRINITY	-	2	29	44	49	53
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001107	MANUFACTURING	HENDERSON	TRINITY	-	-	3	4	5	5
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001129	MANUFACTURING	KAUFMAN	TRINITY	-	1	15	22	23	25
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001175	MANUFACTURING	NAVARRO	TRINITY	-	1	16	23	25	27
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001184	MANUFACTURING	PARKER	TRINITY	-	-	4	6	7	7
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001199	MANUFACTURING	ROCKWALL	TRINITY	-	-	-	-	1	1
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001220	MANUFACTURING	TARRANT	TRINITY	-	35	413	630	711	784
C01CONSMFG	MANUFACTURING CONSERVATION	CONSERVATION	031001249	MANUFACTURING	WISE	TRINITY	-	1	12	18	19	21
C01CONSACC	MUNICIPAL CONSERVATION-ACCELERATED	CONSERVATION	030151000	DALLAS	COLLIN	TRINITY	316	242	20	-	-	-
C01CONSACC	MUNICIPAL CONSERVATION-ACCELERATED	CONSERVATION	030151000	DALLAS	DALLAS	TRINITY	6,891	5,235	437	-	-	-
C01CONSACC	MUNICIPAL CONSERVATION-ACCELERATED	CONSERVATION	030151000	DALLAS	DENTON	TRINITY	147	108	9	-	-	-
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030008000	ALLEN	COLLIN	TRINITY	708	1,430	1,960	2,346	2,694	3,019
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030813000	ANNA	COLLIN	TRINITY	43	141	243	366	543	936
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030829000	BLUE RIDGE	COLLIN	TRINITY	5	25	48	80	125	150
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034041000	CADDO BASIN SUD	COLLIN	TRINITY	4	13	17	22	28	34
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030103000	CELINA	COLLIN	TRINITY	31	259	630	1,263	2,157	2,750
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757043	COUNTY-OTHER	COLLIN	TRINITY	14	41	41	40	38	36
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034083000	CULLEOKA WSC	COLLIN	TRINITY	21	80	102	126	154	185
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030151000	DALLAS	COLLIN	TRINITY	435	782	986	1,149	1,318	1,407
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034086000	DANVILLE WSC	COLLIN	TRINITY	30	76	106	141	182	231
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034096000	EAST FORK SUD	COLLIN	TRINITY	10	36	47	58	71	86
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030772000	FAIRVIEW	COLLIN	TRINITY	48	105	160	275	520	1,017
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030199000	FARMERSVILLE	COLLIN	TRINITY	6	38	59	96	151	221
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030221000	FRISCO	COLLIN	TRINITY	1,319	4,345	5,104	5,924	6,805	7,561
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034146000	GUNTER RURAL WSC	COLLIN	TRINITY	12	43	53	67	82	100
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034203000	HICKORY CREEK SUD	COLLIN	TRINITY	-	1	1	2	2	3
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031031000	JOSEPHINE	COLLIN	TRINITY	1	13	14	15	16	16
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034230000	LAVON WSC	COLLIN	TRINITY	8	34	52	110	182	260
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031041000	LOWRY CROSSING	COLLIN	TRINITY	10	23	31	40	51	214
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030718000	LUCAS	COLLIN	TRINITY	37	64	84	116	175	254
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030379000	MCKINNEY	COLLIN	TRINITY	931	2,996	4,851	7,228	9,407	11,700
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030914000	MELISSA	COLLIN	TRINITY	87	240	357	497	693	956
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034257000	MILLIGAN WSC	COLLIN	TRINITY	3	11	12	13	13	14
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030418000	MUENSTER	COOKE	TRINITY	11	25	31	38	47	57
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030724000	MURPHY	COLLIN	TRINITY	51	337	384	431	479	527
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031045000	NEVADA	COLLIN	TRINITY	2	8	12	26	50	139
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030923000	NEW HOPE	COLLIN	TRINITY	7	19	36	62	105	259
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034278000	NORTH COLLIN WSC	COLLIN	TRINITY	31	76	102	131	166	206
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030733000	PARKER	COLLIN	TRINITY	55	186	322	604	1,000	1,530
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030472000	PLANO	COLLIN	TRINITY	1,937	3,439	4,180	4,970	5,800	6,692
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030487000	PRINCETON	COLLIN	TRINITY	9	55	108	194	350	563
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030799000	PROSPER	COLLIN	TRINITY	64	373	626	806	966	1,140
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030498000	RICHARDSON	COLLIN	TRINITY	185	474	561	643	726	812
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030742000	SACHSE	COLLIN	TRINITY	22	65	87	103	117	132
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031072000	SAINT PAUL	COLLIN	TRINITY	6	28	63	113	149	172
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034336000	SOUTH GRAYSON WSC	COLLIN	TRINITY	4	11	12	13	14	15
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031069000	WESTON	COLLIN	TRINITY	5	41	92	299	584	1,108
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030669000	WYLIE	COLLIN	TRINITY	281	877	1,196	1,816	2,059	2,420
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034028000	BOLIVAR WSC	COOKE	TRINITY	3	12	14	15	16	17
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757049	COUNTY-OTHER	COOKE	TRINITY	12	46	51	55	58	61
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030225000	GAINESVILLE	COOKE	TRINITY	111	222	282	342	411	496
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034223000	KIOWA HOMEOWNERS WSC	COOKE	TRINITY	6	21	24	26	28	29
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030899000	LINDSAY	COOKE	TRINITY	5	10	12	13	14	16
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030981000	VALLEY VIEW	COOKE	TRINITY	3	17	31	46	83	110
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034403000	WOODBINE WSC	COOKE	TRINITY	9	33	39	44	50	57

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030673000	ADDISON	DALLAS	TRINITY	213	345	465	587	707	826
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030033000	BALCH SPRINGS	DALLAS	TRINITY	32	119	134	149	164	180
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030098000	CARROLLTON	DALLAS	TRINITY	304	548	643	734	829	929
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030102000	CEDAR HILL	DALLAS	TRINITY	693	2,256	2,751	3,181	3,608	4,002
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030121000	COCKRELL HILL	DALLAS	TRINITY	7	26	29	31	33	36
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030766000	COMBINE	DALLAS	TRINITY	2	6	8	9	10	13
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034066000	COMBINE WSC	DALLAS	TRINITY	3	11	13	16	19	23
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030133000	COPPELL	DALLAS	TRINITY	283	507	586	665	745	826
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757057	COUNTY-OTHER	DALLAS	TRINITY	2	7	6	5	4	3
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030151000	DALLAS	DALLAS	TRINITY	9,491	16,910	21,067	24,888	31,078	37,898
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034085000	DALLAS COUNTY WCID #6	DALLAS	TRINITY	10	38	47	56	69	86
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030161000	DE SOTO	DALLAS	TRINITY	309	668	886	1,127	1,413	1,613
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030171000	DUNCANVILLE	DALLAS	TRINITY	226	439	513	588	668	753
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034096000	EAST FORK SUD	DALLAS	TRINITY	2	6	7	7	8	9
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030198000	FARMERS BRANCH	DALLAS	TRINITY	295	525	667	819	980	1,149
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030230000	GARLAND	DALLAS	TRINITY	1,251	2,533	3,083	3,646	4,229	4,663
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030697000	GLENN HEIGHTS	DALLAS	TRINITY	15	55	68	81	94	109
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030245000	GRAND PRAIRIE	DALLAS	TRINITY	710	1,552	2,067	2,752	3,603	4,597
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030276000	HIGHLAND PARK	DALLAS	TRINITY	24	73	87	102	117	132
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030294000	HUTCHINS	DALLAS	TRINITY	37	126	232	394	589	692
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030298000	IRVING	DALLAS	TRINITY	1,452	2,563	3,229	3,900	4,577	5,263
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030345000	LANCASTER	DALLAS	TRINITY	100	429	583	756	921	1,059
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030401000	MESQUITE	DALLAS	TRINITY	869	1,949	2,548	3,075	3,504	3,882
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030729000	OVILLA	DALLAS	TRINITY	2	6	11	18	29	46
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030498000	RICHARDSON	DALLAS	TRINITY	678	1,144	1,353	1,552	1,751	1,960
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034325000	ROCKETT SUD	DALLAS	TRINITY	5	18	22	26	31	37
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030521000	ROWLETT	DALLAS	TRINITY	328	764	1,001	1,243	1,485	1,732
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030742000	SACHSE	DALLAS	TRINITY	71	159	212	269	332	397
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034330000	SARDIS-LONE ELM WSC	DALLAS	TRINITY	-	-	-	1	1	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030547000	SEAGOVILLE	DALLAS	TRINITY	30	100	121	145	168	193
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030749000	SUNNYVALE	DALLAS	TRINITY	50	115	173	243	325	371
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030615000	UNIVERSITY PARK	DALLAS	TRINITY	49	154	180	206	232	259
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030657000	WILMER	DALLAS	TRINITY	10	39	49	62	88	147
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030669000	WYLIE	DALLAS	TRINITY	5	15	21	27	33	40
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030677000	ARGYLE	DENTON	TRINITY	69	187	275	347	433	528
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034007000	ARGYLE WSC	DENTON	TRINITY	26	52	58	64	71	78
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030758000	AUBREY	DENTON	TRINITY	8	52	95	88	126	181
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030820000	BARTONVILLE	DENTON	TRINITY	34	125	199	263	310	350
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034010000	BARTONVILLE WSC	DENTON	TRINITY	3	19	25	30	36	42
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034028000	BOLIVAR WSC	DENTON	TRINITY	15	61	134	318	550	790
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030098000	CARROLLTON	DENTON	TRINITY	425	784	952	1,109	1,265	1,417
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030133000	COPPELL	DENTON	TRINITY	3	7	10	14	17	21
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030849000	COPPER CANYON	DENTON	TRINITY	11	28	48	81	106	126
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030691000	CORINTH	DENTON	TRINITY	116	263	348	445	531	615
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757061	COUNTY-OTHER	DENTON	TRINITY	94	336	439	548	668	800
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031011000	CROSS ROADS	DENTON	TRINITY	16	58	112	216	380	530
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030151000	DALLAS	DENTON	TRINITY	202	350	430	492	558	581
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030159000	DENTON	DENTON	TRINITY	847	1,912	2,798	3,773	5,247	8,013
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034089000	DENTON COUNTY FWSD	DENTON	TRINITY	30	81	127	184	251	330
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030768000	DOUBLE OAK	DENTON	TRINITY	20	39	48	58	68	79
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030204000	FLOWER MOUND	DENTON	TRINITY	490	1,159	1,573	2,051	2,479	2,882
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030213000	FORT WORTH	DENTON	TRINITY	33	345	601	985	1,614	2,359
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030221000	FRISCO	DENTON	TRINITY	690	1,648	2,879	3,618	4,281	4,733
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031023000	HACKBERRY	DENTON	TRINITY	3	10	14	17	19	20
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030776000	HEBRON	DENTON	TRINITY	6	18	35	78	130	155
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030704000	HICKORY CREEK	DENTON	TRINITY	8	33	44	58	82	112
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030706000	HIGHLAND VILLAGE	DENTON	TRINITY	102	208	252	291	329	367
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030784000	JUSTIN	DENTON	TRINITY	16	48	89	165	224	272

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03089200	KRUGERVILLE	DENTON	TRINITY	3	9	12	16	22	33
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03078500	KRUM	DENTON	TRINITY	7	40	36	52	71	97
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03033700	LAKE DALLAS	DENTON	TRINITY	15	82	102	122	140	158
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03035500	LEWISVILLE	DENTON	TRINITY	601	1,306	1,737	2,146	2,540	2,979
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03101800	LINCOLN PARK	DENTON	TRINITY	2	12	11	14	18	22
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03079000	LITTLE ELM	DENTON	TRINITY	190	475	643	725	806	888
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03427100	MUSTANG WSC	DENTON	TRINITY	18	72	101	134	170	211
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03102000	NORTHLAKE	DENTON	TRINITY	29	59	128	212	281	332
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03093000	OAK POINT	DENTON	TRINITY	8	50	74	103	137	177
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03046500	PILOT POINT	DENTON	TRINITY	18	94	123	90	103	117
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03047200	PLANO	DENTON	TRINITY	42	102	120	139	158	177
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03102100	PONDER	DENTON	TRINITY	18	78	184	340	446	512
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03079900	PROSPER	DENTON	TRINITY	16	110	225	384	473	570
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03080000	ROANOKE	DENTON	TRINITY	34	91	168	261	393	527
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03053500	SANGER	DENTON	TRINITY	75	162	220	294	366	419
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03080300	SHADY SHORES	DENTON	TRINITY	4	26	23	29	36	44
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03057000	SOUTHLAKE	DENTON	TRINITY	9	32	56	85	139	161
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03075200	THE COLONY	DENTON	TRINITY	90	341	407	444	482	511
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03080600	TROPHY CLUB	DENTON	TRINITY	74	142	182	225	274	328
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03099900	BARDWELL	ELLIS	TRINITY	2	7	9	11	13	16
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03402900	BRANDON-IRENE WSC	ELLIS	TRINITY	-	1	1	1	1	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03404000	BUENA VISTA - BETHEL SUD	ELLIS	TRINITY	17	40	49	62	79	100
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03010200	CEDAR HILL	ELLIS	TRINITY	1	2	2	2	2	2
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03406800	COMMUNITY WATER COMPANY	ELLIS	TRINITY	2	8	11	13	16	20
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03075707	COUNTY-OTHER	ELLIS	TRINITY	19	68	74	81	87	93
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03019200	ENNIS	ELLIS	TRINITY	110	266	384	546	770	1,079
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03020100	FERRIS	ELLIS	TRINITY	3	12	13	14	15	16
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03411200	FILES VALLEY WSC	ELLIS	TRINITY	1	5	6	7	8	9
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03069700	GLENN HEIGHTS	ELLIS	TRINITY	5	22	30	39	49	60
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03024500	GRAND PRAIRIE	ELLIS	TRINITY	2	20	56	105	172	267
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03029900	ITALY	ELLIS	TRINITY	4	16	20	23	27	32
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03421600	JOHNSON COUNTY RURAL SUD	ELLIS	TRINITY	-	2	3	3	4	5
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03038400	MANSFIELD	ELLIS	TRINITY	4	14	28	49	82	130
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03091100	MAYPEARL	ELLIS	TRINITY	4	9	10	11	12	13
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03040500	MIDLOTHIAN	ELLIS	TRINITY	89	248	421	577	747	910
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03091600	MILFORD	ELLIS	TRINITY	1	4	4	5	5	5
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03426900	MOUNTAIN PEAK WSC	ELLIS	TRINITY	148	443	479	560	705	896
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03092900	OAK LEAF	ELLIS	TRINITY	10	22	29	37	47	58
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03072900	OVILLA	ELLIS	TRINITY	33	80	113	141	157	173
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03073100	PALMER	ELLIS	TRINITY	3	13	14	16	18	20
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03093500	PECAN HILL	ELLIS	TRINITY	5	10	13	17	21	26
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03073700	RED OAK	ELLIS	TRINITY	33	76	104	137	176	224
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03440900	RICE WSC	ELLIS	TRINITY	2	8	11	14	17	21
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03432500	ROCKETT SUD	ELLIS	TRINITY	58	221	258	312	380	463
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03433000	SARDIS-LONE ELM WSC	ELLIS	TRINITY	51	96	111	137	181	242
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03063300	WAXAHACHIE	ELLIS	TRINITY	229	580	823	1,155	1,612	2,241
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03075707	COUNTY-OTHER	FANNIN	TRINITY	2	8	9	9	9	9
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03420300	HICKORY CREEK SUD	FANNIN	TRINITY	-	1	1	1	2	2
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03035200	LEONARD	FANNIN	TRINITY	4	15	22	36	57	75
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03434100	SOUTHWEST FANNIN COUNTY SU	FANNIN	TRINITY	-	-	-	-	1	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03097800	TRENTON	FANNIN	TRINITY	22	88	148	240	368	503
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03075708	COUNTY-OTHER	FREESTONE	TRINITY	14	49	53	57	60	63
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03019600	FAIRFIELD	FREESTONE	TRINITY	34	65	81	98	118	139
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03411400	FLO COMMUNITY WSC	FREESTONE	TRINITY	-	2	2	2	2	2
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03059600	TEAGUE	FREESTONE	TRINITY	4	16	20	23	27	32
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03066800	WORTHAM	FREESTONE	TRINITY	7	14	16	18	20	22
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03097400	TIOGA	GRAYSON	TRINITY	6	27	42	53	64	73
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	03076500	COLLINSVILLE	GRAYSON	TRINITY	11	18	25	32	40	49

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757091	COUNTY-OTHER	GRAYSON	TRINITY	5	20	21	21	21	20
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030876000	GUNTER	GRAYSON	TRINITY	6	26	34	42	51	62
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034146000	GUNTER RURAL WSC	GRAYSON	TRINITY	2	9	12	17	29	43
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030286000	HOWE	GRAYSON	TRINITY	7	45	69	54	65	78
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034239000	LUELLA WSC	GRAYSON	TRINITY	7	26	30	33	36	43
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034336000	SOUTH GRAYSON WSC	GRAYSON	TRINITY	3	14	19	26	34	45
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030976000	TOM BEAN	GRAYSON	TRINITY	23	67	77	84	91	99
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034367000	TWO WAY SUD	GRAYSON	TRINITY	3	14	18	23	28	33
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030619000	VAN ALSTYNE	GRAYSON	TRINITY	31	127	198	254	308	353
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030650000	WHITESBORO	GRAYSON	TRINITY	15	28	32	36	41	45
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034403000	WOODBINE WSC	GRAYSON	TRINITY	-	1	1	1	1	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030028000	ATHENS	HENDERSON	TRINITY	24	152	212	288	388	520
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034016000	BETHEL-ASH WSC	HENDERSON	TRINITY	3	14	17	21	25	30
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757107	COUNTY-OTHER	HENDERSON	TRINITY	2	8	9	10	11	12
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034094000	EAST CEDAR CREEK FWSD	HENDERSON	TRINITY	74	178	241	313	407	531
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030864000	EUSTACE	HENDERSON	TRINITY	5	11	13	16	19	23
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030699000	GUN BARREL CITY	HENDERSON	TRINITY	37	82	106	135	171	218
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031039000	LOG CABIN	HENDERSON	TRINITY	2	7	8	9	9	10
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030375000	MABANK	HENDERSON	TRINITY	5	14	15	17	19	21
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030383000	MALAKOFF	HENDERSON	TRINITY	4	14	16	18	21	24
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030934000	PAYNE SPRINGS	HENDERSON	TRINITY	5	10	12	14	16	20
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030959000	SEVEN POINTS	HENDERSON	TRINITY	2	10	12	15	18	22
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030753000	TOOL	HENDERSON	TRINITY	5	18	22	26	31	38
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030609000	TRINIDAD	HENDERSON	TRINITY	2	7	8	9	10	11
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034371000	VIRGINIA HILL WSC	HENDERSON	TRINITY	5	19	20	21	22	24
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034381000	WEST CEDAR CREEK MUD	HENDERSON	TRINITY	24	93	118	145	180	224
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757119	COUNTY-OTHER	JACK	TRINITY	5	20	25	30	34	40
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030302000	JACKSBORO	JACK	TRINITY	7	23	26	28	30	33
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034001000	ABLE SPRINGS WSC	KAUFMAN	TRINITY	9	38	52	68	89	116
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034065000	COLLEGE MOUND WSC	KAUFMAN	TRINITY	18	75	97	122	153	194
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030766000	COMBINE	KAUFMAN	TRINITY	3	12	15	19	24	30
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034066000	COMBINE WSC	KAUFMAN	TRINITY	5	23	32	42	57	75
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757129	COUNTY-OTHER	KAUFMAN	TRINITY	24	71	77	83	88	94
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030767000	CRANDALL	KAUFMAN	TRINITY	24	63	90	123	169	228
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030207000	FORNEY	KAUFMAN	TRINITY	67	249	350	455	561	674
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034115000	FORNEY LAKE WSC	KAUFMAN	TRINITY	75	130	156	183	211	242
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034137000	GASTONIA-SCURRY	KAUFMAN	TRINITY	16	59	73	93	120	155
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034205000	HIGH POINT WSC	KAUFMAN	TRINITY	9	35	45	57	72	92
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030313000	KAUFMAN	KAUFMAN	TRINITY	15	97	82	100	120	155
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030711000	KEMP	KAUFMAN	TRINITY	6	12	8	8	9	9
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030375000	MABANK	KAUFMAN	TRINITY	37	110	136	165	203	252
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030928000	OAK GROVE	KAUFMAN	TRINITY	2	7	9	12	15	19
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030547000	SEAGOVILLE	KAUFMAN	TRINITY	-	-	-	-	-	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031065000	TALTY	KAUFMAN	TRINITY	24	59	96	145	213	304
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030599000	TERRELL	KAUFMAN	TRINITY	100	218	292	361	438	539
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034381000	WEST CEDAR CREEK MUD	KAUFMAN	TRINITY	17	78	109	147	195	259
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030828000	BLOOMING GROVE	NAVARRO	TRINITY	2	6	6	9	10	12
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034029000	BRANDON-IRENE WSC	NAVARRO	TRINITY	1	1	1	2	2	2
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034049000	CHATFIELD WSC	NAVARRO	TRINITY	10	39	51	65	82	104
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034068000	COMMUNITY WATER COMPANY	NAVARRO	TRINITY	2	8	10	14	18	23
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030137000	CORSICANA	NAVARRO	TRINITY	46	158	184	341	413	497
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757175	COUNTY-OTHER	NAVARRO	TRINITY	3	11	11	12	13	13
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030855000	DAWSON	NAVARRO	TRINITY	2	6	7	13	15	19
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030868000	FROST	NAVARRO	TRINITY	1	5	5	6	7	8
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030712000	KERENS	NAVARRO	TRINITY	3	11	12	14	15	16
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034241000	M E N WSC	NAVARRO	TRINITY	7	22	26	30	34	39
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034413000	NAVARRO MILLS WSC	NAVARRO	TRINITY	6	23	31	41	54	72
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030947000	RICE	NAVARRO	TRINITY	2	8	16	21	28	36

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034409000	RICE WSC	NAVARRO	TRINITY	12	49	63	80	101	128
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030674000	ALEDO	PARKER	TRINITY	15	37	53	71	91	116
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030814000	ANNETTA	PARKER	TRINITY	3	13	16	19	22	26
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030997000	ANNETTA SOUTH	PARKER	TRINITY	1	5	6	7	9	10
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030031000	AZLE	PARKER	TRINITY	18	16	22	27	34	41
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757184	COUNTY-OTHER	PARKER	TRINITY	29	106	100	93	84	74
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030213000	FORT WORTH	PARKER	TRINITY	79	598	1,068	1,394	1,783	2,170
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030883000	HUDSON OAKS	PARKER	TRINITY	6	26	36	47	60	75
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030739000	RENO	PARKER	TRINITY	4	16	18	19	21	22
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030574000	SPRINGTOWN	PARKER	TRINITY	17	42	58	78	100	125
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034373000	WALNUT CREEK SUD	PARKER	TRINITY	33	125	157	189	226	268
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030634000	WEATHERFORD	PARKER	TRINITY	149	339	461	587	732	906
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030756000	WILLOW PARK	PARKER	TRINITY	20	49	40	50	60	73
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034024000	BLACKLAND WSC	ROCKWALL	TRINITY	2	10	13	16	21	26
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757199	COUNTY-OTHER	ROCKWALL	TRINITY	1	4	5	5	5	6
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034096000	EAST FORK SUD	ROCKWALL	TRINITY	-	-	-	-	-	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034115000	FORNEY LAKE WSC	ROCKWALL	TRINITY	59	130	156	183	211	242
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030702000	HEATH	ROCKWALL	TRINITY	52	131	190	263	358	478
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034205000	HIGH POINT WSC	ROCKWALL	TRINITY	1	4	5	6	8	10
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034230000	LAVON WSC	ROCKWALL	TRINITY	8	34	47	62	80	103
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031042000	MCLENDON-CHISHOLM	ROCKWALL	TRINITY	3	11	14	17	22	27
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034270000	MT ZION WSC	ROCKWALL	TRINITY	13	33	42	53	64	73
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034313000	R-C-H WSC	ROCKWALL	TRINITY	12	26	32	38	46	55
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030513000	ROCKWALL	ROCKWALL	TRINITY	247	737	1,106	1,422	1,643	1,827
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030521000	ROWLETT	ROCKWALL	TRINITY	48	93	106	120	133	146
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030669000	WYLIE	ROCKWALL	TRINITY	6	19	27	37	50	57
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030025000	ARLINGTON	TARRANT	TRINITY	2,252	4,627	5,714	6,662	7,596	8,507
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030031000	AZLE	TARRANT	TRINITY	79	80	124	182	245	309
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030044000	BEDFORD	TARRANT	TRINITY	283	529	632	734	841	953
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030051000	BENBROOK	TARRANT	TRINITY	119	287	398	540	722	950
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034017000	BETHESDA WSC	TARRANT	TRINITY	21	82	106	132	165	207
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030062000	BLUE MOUND	TARRANT	TRINITY	4	15	16	17	18	19
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030125000	COLLEYVILLE	TARRANT	TRINITY	243	454	550	639	724	808
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034069000	COMMUNITY WSC	TARRANT	TRINITY	6	21	23	24	26	28
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757220	COUNTY-OTHER	TARRANT	TRINITY	41	150	161	171	182	192
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030145000	CROWLEY	TARRANT	TRINITY	17	66	90	131	169	195
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030692000	DALWORTHINGTON GARDENS	TARRANT	TRINITY	21	40	49	57	65	73
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030180000	EDGECLIFF	TARRANT	TRINITY	14	28	31	35	38	41
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030193000	EULESS	TARRANT	TRINITY	272	539	655	761	862	963
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030194000	EVERMAN	TARRANT	TRINITY	11	41	47	53	60	65
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030206000	FOREST HILL	TARRANT	TRINITY	23	84	98	113	130	144
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030213000	FORT WORTH	TARRANT	TRINITY	4,067	7,988	10,869	15,061	21,286	29,792
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030245000	GRAND PRAIRIE	TARRANT	TRINITY	187	422	538	645	744	841
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030249000	GRAPEVINE	TARRANT	TRINITY	375	747	944	1,137	1,328	1,518
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030261000	HALTOM CITY	TARRANT	TRINITY	216	265	306	340	371	401
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030879000	HASLET	TARRANT	TRINITY	13	47	94	105	117	128
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030293000	HURST	TARRANT	TRINITY	214	416	494	568	643	719
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034216000	JOHNSON COUNTY RURAL SUD	TARRANT	TRINITY	5	18	24	32	41	52
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030315000	KELLER	TARRANT	TRINITY	279	597	685	770	859	948
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030318000	KENNEDALE	TARRANT	TRINITY	57	151	181	209	233	256
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030341000	LAKE WORTH	TARRANT	TRINITY	28	59	75	91	110	125
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031036000	LAKESIDE	TARRANT	TRINITY	20	49	61	74	90	110
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030384000	MANSFIELD	TARRANT	TRINITY	396	975	1,451	2,016	2,510	2,784
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030435000	NORTH RICHLAND HILLS	TARRANT	TRINITY	366	758	936	1,102	1,264	1,424
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030454000	PANTEGO	TARRANT	TRINITY	18	32	37	42	47	52
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030795000	PELICAN BAY	TARRANT	TRINITY	3	12	14	16	19	22
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030499000	RICHLAND HILLS	TARRANT	TRINITY	40	49	57	65	73	79
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030505000	RIVER OAKS	TARRANT	TRINITY	12	43	46	49	52	55

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030527000	SAGINAW	TARRANT	TRINITY	90	207	265	321	375	428
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030539000	SANSOM PARK VILLAGE	TARRANT	TRINITY	8	28	30	33	35	38
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030570000	SOUTHLAKE	TARRANT	TRINITY	328	658	838	1,000	1,152	1,296
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030632000	WATAUGA	TARRANT	TRINITY	42	154	171	187	203	220
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031070000	WESTOVER HILLS	TARRANT	TRINITY	7	12	14	17	19	21
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030644000	WESTWORTH VILLAGE	TARRANT	TRINITY	4	15	17	19	21	24
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030651000	WHITE SETTLEMENT	TARRANT	TRINITY	142	87	103	115	134	154
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030810000	ALVORD	WISE	TRINITY	2	8	9	11	12	14
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030816000	AURORA	WISE	TRINITY	2	8	10	12	14	17
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034028000	BOLIVAR WSC	WISE	TRINITY	3	12	15	23	34	54
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030760000	BOYD	WISE	TRINITY	3	12	14	15	16	17
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030076000	BRIDGEPORT	WISE	TRINITY	47	99	164	221	288	382
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030842000	CHICO	WISE	TRINITY	7	10	12	16	21	27
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034069000	COMMUNITY WSC	WISE	TRINITY	-	1	1	1	1	1
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030757249	COUNTY-OTHER	WISE	TRINITY	57	209	223	236	250	264
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030153000	DECATUR	WISE	TRINITY	47	102	163	240	349	455
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030213000	FORT WORTH	WISE	TRINITY	13	115	187	273	408	566
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031047000	NEW FAIRVIEW	WISE	TRINITY	4	15	20	26	32	40
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030920000	NEWARK	WISE	TRINITY	2	10	15	22	32	47
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	030946000	RHOME	WISE	TRINITY	19	60	99	144	192	254
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	031059000	RUNAWAY BAY	WISE	TRINITY	10	21	29	37	47	60
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034373000	WALNUT CREEK SUD	WISE	TRINITY	4	15	20	25	30	37
C01CONSBAS	MUNICIPAL CONSERVATION-BASIC	CONSERVATION	034391000	WEST WISE RURAL SUD	WISE	TRINITY	6	23	27	32	36	42
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030008000	ALLEN	COLLIN	TRINITY	20	236	517	593	613	621
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030813000	ANNA	COLLIN	TRINITY	1	7	16	24	33	48
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030103000	CELINA	COLLIN	TRINITY	-	2	24	56	93	124
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030151000	DALLAS	COLLIN	TRINITY	5	59	385	526	511	467
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034086000	DANVILLE WSC	COLLIN	TRINITY	1	6	10	12	14	16
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030772000	FAIRVIEW	COLLIN	TRINITY	2	26	54	83	140	249
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030221000	FRISCO	COLLIN	TRINITY	257	1,277	1,764	1,910	2,038	2,117
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030379000	MCKINNEY	COLLIN	TRINITY	207	978	1,852	2,569	3,098	3,572
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030914000	MELISSA	COLLIN	TRINITY	1	12	38	58	72	89
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030418000	MUENSTER	COOKE	TRINITY	-	1	6	9	10	11
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030724000	MURPHY	COLLIN	TRINITY	2	31	41	42	42	42
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031045000	NEVADA	COLLIN	TRINITY	-	-	1	1	2	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030923000	NEW HOPE	COLLIN	TRINITY	-	2	2	4	6	12
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034278000	NORTH COLLIN WSC	COLLIN	TRINITY	1	5	8	9	11	12
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030733000	PARKER	COLLIN	TRINITY	2	24	43	72	107	150
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030472000	PLANO	COLLIN	TRINITY	76	397	458	473	489	507
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030799000	PROSPER	COLLIN	TRINITY	2	38	63	74	81	85
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030498000	RICHARDSON	COLLIN	TRINITY	8	81	109	108	107	107
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030742000	SACHSE	COLLIN	TRINITY	6	23	30	32	33	33
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031069000	WESTON	COLLIN	TRINITY	-	1	7	21	38	66
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030669000	WYLIE	COLLIN	TRINITY	5	75	150	214	229	251
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030225000	GAINESVILLE	COOKE	TRINITY	3	14	18	19	20	22
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030899000	LINDSAY	COOKE	TRINITY	-	1	1	1	1	1
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030673000	ADDISON	DALLAS	TRINITY	-	1	13	13	15	15
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030098000	CARROLLTON	DALLAS	TRINITY	11	76	109	110	111	113
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030102000	CEDAR HILL	DALLAS	TRINITY	65	182	233	263	290	313
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030133000	COPPELL	DALLAS	TRINITY	9	94	190	212	210	210
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030151000	DALLAS	DALLAS	TRINITY	109	1,281	8,220	11,390	12,050	12,584
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030161000	DE SOTO	DALLAS	TRINITY	9	57	101	127	141	151
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030171000	DUNCANVILLE	DALLAS	TRINITY	5	29	50	55	55	57
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030198000	FARMERS BRANCH	DALLAS	TRINITY	5	61	254	352	375	397
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030230000	GARLAND	DALLAS	TRINITY	352	971	1,529	1,774	1,852	1,871
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030245000	GRAND PRAIRIE	DALLAS	TRINITY	17	161	337	423	511	604
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030294000	HUTCHINS	DALLAS	TRINITY	-	5	26	48	68	83
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030298000	IRVING	DALLAS	TRINITY	38	368	1,116	1,427	1,482	1,527

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030401000	MESQUITE	DALLAS	TRINITY	229	634	1,113	1,382	1,436	1,455
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030729000	OVILLA	DALLAS	TRINITY	-	-	1	1	2	3
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030498000	RICHARDSON	DALLAS	TRINITY	30	195	262	260	258	258
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030521000	ROWLETT	DALLAS	TRINITY	10	61	76	83	89	94
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030742000	SACHSE	DALLAS	TRINITY	20	57	73	84	93	101
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030749000	SUNNYVALE	DALLAS	TRINITY	2	13	17	21	26	27
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030669000	WYLIE	DALLAS	TRINITY	-	1	3	3	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030677000	ARGYLE	DENTON	TRINITY	-	-	2	2	2	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034007000	ARGYLE WSC	DENTON	TRINITY	1	5	5	5	5	5
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030758000	AUBREY	DENTON	TRINITY	-	-	5	2	1	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030820000	BARTONVILLE	DENTON	TRINITY	-	-	1	2	2	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034010000	BARTONVILLE WSC	DENTON	TRINITY	-	-	2	2	3	3
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030098000	CARROLLTON	DENTON	TRINITY	15	108	162	167	169	173
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030133000	COPPELL	DENTON	TRINITY	-	1	3	4	5	5
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030691000	CORINTH	DENTON	TRINITY	4	24	51	69	75	81
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031011000	CROSS ROADS	DENTON	TRINITY	-	3	4	7	11	15
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030151000	DALLAS	DENTON	TRINITY	2	27	168	225	216	193
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030159000	DENTON	DENTON	TRINITY	14	278	1,151	1,673	2,047	2,719
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034089000	DENTON COUNTY FWSD	DENTON	TRINITY	1	10	14	19	24	30
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030204000	FLOWER MOUND	DENTON	TRINITY	143	442	616	754	821	867
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030213000	FORT WORTH	DENTON	TRINITY	1	24	121	218	311	409
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030221000	FRISCO	DENTON	TRINITY	134	485	995	1,167	1,283	1,326
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030706000	HIGHLAND VILLAGE	DENTON	TRINITY	3	45	85	92	93	94
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030784000	JUSTIN	DENTON	TRINITY	4	16	26	44	54	60
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030355000	LEWISVILLE	DENTON	TRINITY	169	563	1,027	1,253	1,335	1,416
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030790000	LITTLE ELM	DENTON	TRINITY	4	64	124	128	128	128
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030930000	OAK POINT	DENTON	TRINITY	-	-	-	-	1	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030472000	PLANO	DENTON	TRINITY	2	12	13	13	13	13
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031021000	PONDER	DENTON	TRINITY	-	6	15	28	35	37
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030799000	PROSPER	DENTON	TRINITY	1	11	23	35	39	43
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030800000	ROANOKE	DENTON	TRINITY	1	11	34	55	75	94
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030535000	SANGER	DENTON	TRINITY	-	-	2	2	3	3
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030806000	TROPHY CLUB	DENTON	TRINITY	2	13	41	58	63	69
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034040000	BUENA VISTA - BETHEL SUD	ELLIS	TRINITY	-	2	3	3	5	5
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030192000	ENNIS	ELLIS	TRINITY	28	91	183	262	337	436
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030245000	GRAND PRAIRIE	ELLIS	TRINITY	-	2	9	16	24	35
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030384000	MANSFIELD	ELLIS	TRINITY	1	5	12	21	31	46
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030911000	MAYPEARL	ELLIS	TRINITY	-	1	1	1	1	1
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030405000	MIDLOTHIAN	ELLIS	TRINITY	21	94	268	390	463	521
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034269000	MOUNTAIN PEAK WSC	ELLIS	TRINITY	1	4	8	11	13	16
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030729000	OVILLA	ELLIS	TRINITY	1	6	6	8	9	9
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030737000	RED OAK	ELLIS	TRINITY	1	6	9	10	11	14
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034330000	SARDIS-LONE ELM WSC	ELLIS	TRINITY	1	6	7	8	10	13
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030633000	WAXAHACHIE	ELLIS	TRINITY	3	25	135	219	279	357
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030978000	TRENTON	FANNIN	TRINITY	-	1	2	4	5	7
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030196000	FAIRFIELD	FREESTONE	TRINITY	1	3	3	3	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030974000	TIOGA	GRAYSON	TRINITY	1	8	14	16	18	19
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030286000	HOWE	GRAYSON	TRINITY	-	1	5	1	-	-
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030976000	TOM BEAN	GRAYSON	TRINITY	-	1	1	2	2	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030619000	VAN ALSTYNE	GRAYSON	TRINITY	1	7	27	40	47	49
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030650000	WHITESBORO	GRAYSON	TRINITY	-	2	5	6	6	6
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030028000	ATHENS	HENDERSON	TRINITY	-	38	131	175	213	258
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034094000	EAST CEDAR CREEK FWSD	HENDERSON	TRINITY	1	9	13	17	20	24
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030864000	EUSTACE	HENDERSON	TRINITY	1	2	4	4	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030934000	PAYNE SPRINGS	HENDERSON	TRINITY	-	1	1	1	1	1
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030767000	CRANDALL	KAUFMAN	TRINITY	6	19	25	31	39	49
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030207000	FORNEY	KAUFMAN	TRINITY	2	17	38	52	59	65
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034115000	FORNEY LAKE WSC	KAUFMAN	TRINITY	2	13	15	16	17	18

WMS Project ID	Project Name	SRC Name	WUG ID	WUG Name	WUG County Name	WUG Basi	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030313000	KAUFMAN	KAUFMAN	TRINITY	-	16	2	5	5	6
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030375000	MABANK	KAUFMAN	TRINITY	-	2	3	3	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031065000	TALTY	KAUFMAN	TRINITY	1	5	8	10	13	16
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030599000	TERRELL	KAUFMAN	TRINITY	28	78	142	181	195	214
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030828000	BLOOMING GROVE	NAVARRO	TRINITY	-	-	-	-	1	1
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030137000	CORSICANA	NAVARRO	TRINITY	-	-	-	62	147	158
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030855000	DAWSON	NAVARRO	TRINITY	-	-	-	-	1	1
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030674000	ALEDO	PARKER	TRINITY	-	4	6	8	10	11
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030213000	FORT WORTH	PARKER	TRINITY	1	41	214	308	344	377
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030574000	SPRINGTOWN	PARKER	TRINITY	4	10	16	20	23	27
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030634000	WEATHERFORD	PARKER	TRINITY	3	38	140	194	221	251
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030756000	WILLOW PARK	PARKER	TRINITY	-	2	-	-	-	-
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034115000	FORNEY LAKE WSC	ROCKWALL	TRINITY	2	13	15	16	17	18
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030702000	HEATH	ROCKWALL	TRINITY	-	-	1	2	2	2
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034270000	MT ZION WSC	ROCKWALL	TRINITY	-	3	4	4	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	034313000	R-C-H WSC	ROCKWALL	TRINITY	-	2	2	3	3	3
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030513000	ROCKWALL	ROCKWALL	TRINITY	9	75	109	127	133	134
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030521000	ROWLETT	ROCKWALL	TRINITY	1	7	8	8	8	8
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030669000	WYLIE	ROCKWALL	TRINITY	-	2	3	4	6	6
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030025000	ARLINGTON	TARRANT	TRINITY	53	369	1,083	1,401	1,429	1,448
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030031000	AZLE	TARRANT	TRINITY	2	1	-	-	-	-
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030044000	BEDFORD	TARRANT	TRINITY	11	57	72	73	74	75
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030051000	BENBROOK	TARRANT	TRINITY	5	47	86	107	131	157
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030125000	COLLEYVILLE	TARRANT	TRINITY	65	142	148	150	150	151
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030692000	DALWORTHINGTON GARDENS	TARRANT	TRINITY	1	5	7	7	7	7
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030180000	EDGECLIFF	TARRANT	TRINITY	-	2	3	4	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030193000	EULESS	TARRANT	TRINITY	82	236	323	346	349	351
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030213000	FORT WORTH	TARRANT	TRINITY	75	551	2,182	3,328	4,101	5,170
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030245000	GRAND PRAIRIE	TARRANT	TRINITY	4	44	88	99	106	111
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030249000	GRAPEVINE	TARRANT	TRINITY	112	343	520	598	622	640
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030261000	HALTOM CITY	TARRANT	TRINITY	57	3	16	30	30	30
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030293000	HURST	TARRANT	TRINITY	63	161	235	268	271	273
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030315000	KELLER	TARRANT	TRINITY	9	52	85	98	98	98
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030318000	KENNEDALE	TARRANT	TRINITY	1	6	18	26	28	29
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030341000	LAKE WORTH	TARRANT	TRINITY	1	4	11	17	18	19
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031036000	LAKESIDE	TARRANT	TRINITY	3	11	16	18	20	24
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030384000	MANSFIELD	TARRANT	TRINITY	111	381	634	847	961	986
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030435000	NORTH RICHLAND HILLS	TARRANT	TRINITY	109	312	407	440	455	466
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030454000	PANTEGO	TARRANT	TRINITY	1	4	5	5	5	5
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030499000	RICHLAND HILLS	TARRANT	TRINITY	-	-	2	3	3	3
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030527000	SAGINAW	TARRANT	TRINITY	2	15	24	28	30	30
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030570000	SOUTHLAKE	TARRANT	TRINITY	-	-	4	4	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	031070000	WESTOVER HILLS	TARRANT	TRINITY	2	4	4	4	4	4
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030651000	WHITE SETTLEMENT	TARRANT	TRINITY	2	1	-	-	-	-
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030076000	BRIDGEPORT	WISE	TRINITY	1	7	23	36	42	51
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030153000	DECATUR	WISE	TRINITY	1	10	35	55	71	85
C01CONSEXP	MUNICIPAL CONSERVATION-EXPANDED	CONSERVATION	030213000	FORT WORTH	WISE	TRINITY	-	8	38	60	79	98
Total							52,095	110,803	154,475	196,101	238,662	286,681

Appendix D

DB07 – Region C Current Reuse Supplies in Trinity Basin

This Page

Intentionally Left Blank

WUG ID	WUG Name	WUG County Name	WUG Basin Name	SRC Name	SRC County Name	SRC Basin Name	WS2010	WS2020	WS2030	WS2040	WS2050	WS2060
030008000	ALLEN	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	2,232	2,109	2,122	1,963	1,826	1,680
034024000	BLACKLAND WSC	ROCKWALL	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	32	36	37	39	42	46
034024000	BLACKLAND WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	13	15	16	16	18	20
034041000	CADDO BASIN SUD	COLLIN	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	39	38	40	43	46	49
034041000	CADDO BASIN SUD	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	18	17	19	20	21	23
034045000	CASH SUD	ROCKWALL	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	4	4	3	9	10	11
034065000	COLLEGE MOUND WSC	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	46	69	90	97	108	122
030757043	COUNTY-OTHER	COLLIN	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	2	1	1	1	1	1
030757043	COUNTY-OTHER	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	37	26	20	16	13	11
030757061	COUNTY-OTHER	DENTON	TRINITY	DIRECT REUSE	DENTON	TRINITY	-	-	-	-	-	-
030757129	COUNTY-OTHER	KAUFMAN	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	31	24	21	18	16	15
030757129	COUNTY-OTHER	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	72	55	47	41	37	34
030757199	COUNTY-OTHER	ROCKWALL	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	17	14	12	10	9	9
030757199	COUNTY-OTHER	ROCKWALL	TRINITY	DIRECT REUSE	ROCKWALL	TRINITY	-	-	-	-	-	-
030757199	COUNTY-OTHER	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	10	8	7	6	5	5
030757220	COUNTY-OTHER	TARRANT	TRINITY	DIRECT REUSE	TARRANT	TRINITY	-	-	-	-	-	-
030767000	CRANDALL	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	69	73	79	86	97	109
034083000	CULLEOKA WSC	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	86	99	102	105	111	116
034086000	DANVILLE WSC	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	80	84	89	94	101	107
030159000	DENTON	DENTON	TRINITY	INDIRECT REUSE	DENTON	TRINITY	1,682	2,130	2,915	3,475	4,372	5,382
034096000	EAST FORK SUD	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	52	52	52	54	56	59
034096000	EAST FORK SUD	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	11	9	8	7	6	6
034096000	EAST FORK SUD	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	1	1	1	-	-	-
030772000	FAIRVIEW	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	162	168	185	244	371	593
030199000	FARMERSVILLE	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	53	76	91	120	160	199
030207000	FORNEY	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	183	295	312	320	325	326
034115000	FORNEY LAKE WSC	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	210	173	154	140	133	126
034115000	FORNEY LAKE WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	165	173	154	140	133	126
030221000	FRISCO	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	2,824	3,507	3,239	3,067	2,980	2,819
030221000	FRISCO	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	1,479	1,330	1,827	1,874	1,875	1,765
030230000	GARLAND	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	4,048	3,345	3,024	2,788	2,639	2,408
034137000	GASTONIA-SCURRY	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	79	88	86	91	100	112
030249000	GRAPEVINE	TARRANT	TRINITY	INDIRECT REUSE	TARRANT	TRINITY	1,824	2,033	2,180	2,278	2,352	2,412
031023000	HACKBERRY	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	13	15	17	17	16	15
030702000	HEATH	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	166	188	201	216	238	262
034205000	HIGH POINT WSC	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	36	44	46	49	54	61
034205000	HIGH POINT WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	3	5	5	5	6	7
031004043	IRRIGATION	COLLIN	TRINITY	DIRECT REUSE	COLLIN	TRINITY	2,227	2,227	2,227	2,227	2,227	2,227
031004049	IRRIGATION	COOKE	TRINITY	DIRECT REUSE	COOKE	TRINITY	9	9	9	9	9	9
031004057	IRRIGATION	DALLAS	TRINITY	DIRECT REUSE	DALLAS	TRINITY	561	561	561	561	561	561
031004057	IRRIGATION	DALLAS	TRINITY	INDIRECT REUSE	DALLAS	TRINITY	8,000	8,000	8,000	8,000	8,000	8,000
031004061	IRRIGATION	DENTON	TRINITY	DIRECT REUSE	DENTON	TRINITY	2,099	2,195	2,276	2,348	2,428	2,509
031004129	IRRIGATION	KAUFMAN	TRINITY	DIRECT REUSE	KAUFMAN	TRINITY	576	758	927	1,116	1,359	1,659
031004184	IRRIGATION	PARKER	BRAZOS	DIRECT REUSE	PARKER	TRINITY	202	202	202	202	202	202
031004184	IRRIGATION	PARKER	TRINITY	DIRECT REUSE	PARKER	TRINITY	11	11	11	11	11	11
031004199	IRRIGATION	ROCKWALL	TRINITY	DIRECT REUSE	ROCKWALL	TRINITY	784	784	784	784	784	784
031004220	IRRIGATION	TARRANT	TRINITY	DIRECT REUSE	TARRANT	TRINITY	1,708	1,986	2,381	2,827	3,300	3,715
031004220	IRRIGATION	TARRANT	TRINITY	INDIRECT REUSE	TARRANT	TRINITY	1,493	1,663	1,784	1,864	1,924	1,974
031031000	JOSEPHINE	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	10	21	18	15	14	13
030313000	KAUFMAN	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	109	126	126	126	127	140
034230000	LAVON WSC	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	35	43	53	93	134	166
034230000	LAVON WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	31	43	47	52	59	66
030790000	LITTLE ELM	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	448	556	571	505	461	420
031041000	LOWRY CROSSING	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	30	29	29	30	31	107
030718000	LUCAS	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	97	112	115	130	169	210
031001043	MANUFACTURING	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	1,247	1,119	1,087	1,073	1,069	1,063
031001057	MANUFACTURING	DALLAS	TRINITY	DIRECT REUSE	DALLAS	TRINITY	20	20	20	20	20	20
031001057	MANUFACTURING	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	611	526	491	467	450	413

WUG ID	WUG Name	WUG County Name	WUG Basin Name	SRC Name	SRC County Name	SRC Basin Name	WS2010	WS2020	WS2030	WS2040	WS2050	WS2060
031001129	MANUFACTURING	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	47	39	36	34	33	32
031001199	MANUFACTURING	ROCKWALL	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	1	1	1	1	1	1
031001199	MANUFACTURING	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	1	1	1	1	1	1
030379000	MCKINNEY	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	2,331	2,946	3,679	4,403	4,787	5,014
031042000	MCLENDON-CHISHOLM	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	18	18	18	19	20	22
030914000	MELISSA	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	209	309	345	377	430	492
030401000	MESQUITE	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	2,705	2,510	2,439	2,305	2,148	1,973
034257000	MILLIGAN WSC	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	19	14	12	10	9	8
031003249	MINING	WISE	TRINITY	DIRECT REUSE	WISE	TRINITY	15,930	14,074	12,152	10,643	9,236	8,061
034270000	MT ZION WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	42	47	45	43	43	40
030724000	MURPHY	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	147	425	363	319	291	266
031045000	NEVADA	COLLIN	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	17	26	26	46	71	161
031045000	NEVADA	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	7	13	13	23	35	81
030923000	NEW HOPE	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	25	28	40	52	72	146
034278000	NORTH COLLIN WSC	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	83	82	83	85	89	93
030928000	OAK GROVE	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	12	11	11	11	12	13
030733000	PARKER	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	181	299	374	537	716	894
030472000	PLANO	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	6,687	5,338	4,722	4,316	4,059	3,832
030472000	PLANO	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	146	158	136	121	110	101
030487000	PRINCETON	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	63	115	175	256	389	532
030799000	PROSPER	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	105	393	501	505	494	481
030799000	PROSPER	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	26	116	180	241	242	240
034313000	R-C-H WSC	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	39	32	29	28	27	27
030498000	RICHARDSON	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	653	775	663	580	525	479
030498000	RICHARDSON	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	2,401	1,869	1,599	1,399	1,266	1,155
030513000	ROCKWALL	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	795	1,096	1,204	1,195	1,119	1,021
030521000	ROWLETT	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	1,010	1,000	974	947	924	891
030521000	ROWLETT	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	149	122	103	91	83	75
030522000	ROYSE CITY	COLLIN	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	30	77	105	140	170	174
030522000	ROYSE CITY	ROCKWALL	SABINE	INDIRECT REUSE LAVON	COLLIN	TRINITY	228	320	269	293	315	292
030742000	SACHSE	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	68	86	85	78	73	68
030742000	SACHSE	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	217	209	208	206	207	205
031072000	SAINT PAUL	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	18	34	58	82	89	85
031002043	STEAM ELECTRIC POWER	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	75	46	46	48	52	57
031002057	STEAM ELECTRIC POWER	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	10	6	6	6	7	8
031002061	STEAM ELECTRIC POWER	DENTON	TRINITY	DIRECT REUSE	DENTON	TRINITY	831	1,840	2,288	2,849	3,363	3,363
031002070	STEAM ELECTRIC POWER	ELLIS	TRINITY	DIRECT REUSE	ELLIS	TRINITY	2,098	2,615	3,302	3,363	3,363	3,363
031002129	STEAM ELECTRIC POWER	KAUFMAN	TRINITY	DIRECT REUSE	KAUFMAN	TRINITY	3,000	3,000	3,000	3,000	3,000	3,000
030749000	SUNNYVALE	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	167	180	197	212	229	214
031065000	TALTY	KAUFMAN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	79	97	114	132	155	181
030752000	THE COLONY	DENTON	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	49	48	46	41	38	35
030633000	WAXAHACHIE	ELLIS	TRINITY	INDIRECT REUSE	ELLIS	TRINITY	1,886	2,166	2,445	2,724	3,004	3,283
030669000	WYLIE	COLLIN	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	624	758	807	994	949	946
030669000	WYLIE	DALLAS	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	11	13	14	15	15	16
030669000	WYLIE	ROCKWALL	TRINITY	INDIRECT REUSE LAVON	COLLIN	TRINITY	13	16	18	20	23	22
Total							79,340	80,663	81,853	82,700	83,900	84,749

Appendix E

DB07 – Region C WMS Reuse Supplies in Trinity Basin

This Page

Intentionally Left Blank

WMS Project ID	Project Name	SRC Name	SRC County Name	SRC Basin Name	WUG ID	WUG Name	WUG County Name	WUG Basin Name	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C38.2	CONVEYANCE AND TREATMENT PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030044000	BEDFORD	TARRANT	TRINITY	1,600	2,968	2,936	2,677	2,465	2,433
C38.2	CONVEYANCE AND TREATMENT PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030196000	FAIRFIELD	FREESTONE	TRINITY	-	-	506	534	423	456
C37.2	CONVEYANCE PROJECT (2)	DIRECT REUSE	DALLAS	TRINITY	031004057	IRRIGATION	DALLAS	TRINITY	2,262	2,179	1,843	1,740	1,576	1,243
C37.2	CONVEYANCE PROJECT (2)	DIRECT REUSE	DALLAS	TRINITY	031003057	MINING	DALLAS	TRINITY	248	278	285	298	296	258
C37.2	CONVEYANCE PROJECT (2)	DIRECT REUSE	DALLAS	TRINITY	031002057	STEAM ELECTRIC POWER	DALLAS	TRINITY	1,410	2,459	2,900	3,457	3,768	4,546
C37.2	CONVEYANCE PROJECT (2)	DIRECT REUSE	DALLAS	TRINITY	031002129	STEAM ELECTRIC POWER	KAUFMAN	TRINITY	5,979	12,600	12,600	12,600	12,600	12,600
C37.2	CONVEYANCE PROJECT (2)	DIRECT REUSE	WISE	TRINITY	031002249	STEAM ELECTRIC POWER	WISE	TRINITY	-	-	-	3,500	4,000	4,000
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034040000	BUENA VISTA - BETHEL SUD	ELLIS	TRINITY	79	118	187	171	167	199
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030098000	CARROLLTON	DALLAS	TRINITY	647	1,421	2,459	2,360	2,209	2,037
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030098000	CARROLLTON	DENTON	TRINITY	903	2,033	3,641	3,563	3,368	3,106
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034066000	COMBINE WSC	DALLAS	TRINITY	9	29	57	61	65	69
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034066000	COMBINE WSC	KAUFMAN	TRINITY	19	62	138	166	194	222
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030355000	LEWISVILLE	DENTON	TRINITY	1,248	3,395	6,675	6,932	6,796	6,559
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034269000	MOUNTAIN PEAK WSC	ELLIS	TRINITY	-	-	46	66	128	259
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030729000	OVILLA	DALLAS	TRINITY	4	14	35	49	67	90
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030729000	OVILLA	ELLIS	TRINITY	58	171	368	395	368	337
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030731000	PALMER	ELLIS	TRINITY	7	9	13	10	9	9
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030737000	RED OAK	ELLIS	TRINITY	35	44	45	124	133	351
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034325000	ROCKETT SUD	DALLAS	TRINITY	40	114	149	131	125	149
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034325000	ROCKETT SUD	ELLIS	TRINITY	193	369	745	584	1,042	1,342
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	034330000	SARDIS-LONE ELM WSC	ELLIS	TRINITY	137	202	299	343	395	547
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030752000	THE COLONY	DENTON	TRINITY	279	784	1,491	1,463	1,391	1,281
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	DALLAS	TRINITY	030633000	WAXAHACHIE	ELLIS	TRINITY	262	467	1,404	2,295	1,481	1,775
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	HENDERSON	TRINITY	030814000	ANNETTA	PARKER	TRINITY	-	113	93	101	80	87
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	HENDERSON	TRINITY	030997000	ANNETTA SOUTH	PARKER	TRINITY	-	28	24	27	21	24
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	HENDERSON	TRINITY	030757184	COUNTY-OTHER	PARKER	TRINITY	-	1,284	672	509	286	219
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	HENDERSON	TRINITY	031002081	STEAM ELECTRIC POWER	FREESTONE	TRINITY	-	-	-	1,090	718	655
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	HENDERSON	TRINITY	030756000	WILLOW PARK	PARKER	TRINITY	-	135	191	251	224	266
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030829000	BLUE RIDGE	COLLIN	TRINITY	190	291	411	574	640	680
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030767000	CRANDALL	KAUFMAN	TRINITY	315	304	307	317	348	415
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031023000	HACKBERRY	DENTON	TRINITY	61	64	67	62	58	57
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031004129	IRRIGATION	KAUFMAN	TRINITY	2,666	2,671	1,588	1,351	887	849
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030799000	PROSPER	COLLIN	TRINITY	449	1,624	1,949	1,870	1,779	1,827
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030799000	PROSPER	DENTON	TRINITY	150	481	700	892	871	913
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031002043	STEAM ELECTRIC POWER	COLLIN	TRINITY	442	291	281	279	288	315
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031002129	STEAM ELECTRIC POWER	KAUFMAN	TRINITY	-	1,214	1,443	1,843	1,613	1,929
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030674000	ALEDO	PARKER	TRINITY	183	350	317	363	302	340
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	034017000	BETHESDA WSC	TARRANT	TRINITY	246	538	615	647	683	779
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030087000	BURLESON	TARRANT	TRINITY	132	292	340	359	385	442
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030145000	CROWLEY	TARRANT	TRINITY	199	432	536	657	720	759
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	DALLAS	TRINITY	1,095	2,037	1,221	1,088	732	679
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	ELLIS	TRINITY	4	26	33	42	35	40
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	TARRANT	TRINITY	289	554	318	255	151	124
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030315000	KELLER	TARRANT	TRINITY	1,509	3,206	3,090	2,751	2,483	2,398
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030318000	KENNEDALE	TARRANT	TRINITY	670	921	667	656	463	447
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	031036000	LAKESIDE	TARRANT	TRINITY	223	286	219	238	194	218
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	031003220	MINING	TARRANT	TRINITY	124	175	140	154	123	113
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	031047000	NEW FAIRVIEW	WISE	TRINITY	121	197	166	189	158	179
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030920000	NEWARK	WISE	TRINITY	77	164	146	201	193	262
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030435000	NORTH RICHLAND HILLS	TARRANT	TRINITY	618	1,228	1,269	1,183	1,096	1,081
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	031020000	NORTHLAKE	DENTON	TRINITY	86	185	343	457	496	516
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030454000	PANTEGO	TARRANT	TRINITY	223	201	116	97	62	57
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030795000	PELICAN BAY	TARRANT	TRINITY	95	142	121	120	91	98
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030800000	ROANOKE	DENTON	TRINITY	184	543	830	1,019	1,231	1,436
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030570000	SOUTHLAKE	DENTON	TRINITY	500	500	500	500	500	500
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030570000	SOUTHLAKE	TARRANT	TRINITY	1,450	3,775	4,061	3,831	3,620	3,531
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030574000	SPRINGTOWN	PARKER	TRINITY	44	125	164	187	204	233
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030806000	TROPHY CLUB	DENTON	TRINITY	354	732	786	769	758	793
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE	NAVARRO	TRINITY	030632000	WATAUGA	TARRANT	TRINITY	567	1,046	1,028	929	851	837
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	031004043	IRRIGATION	COLLIN	TRINITY	368	197	145	125	95	90
C37.2	CONVEYANCE PROJECT (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	031003043	MINING	COLLIN	TRINITY	149	80	59	51	39	36
C55	DIRECT REUSE	DIRECT REUSE	TARRANT	TRINITY	031004220	IRRIGATION	TARRANT	TRINITY	-	4,600	7,170	8,290	8,290	8,290
C55	DIRECT REUSE	DIRECT REUSE	TARRANT	TRINITY	031002220	STEAM ELECTRIC POWER	TARRANT	TRINITY	500	500	1,100	2,000	2,600	2,600
C55	DIRECT REUSE	DIRECT REUSE	WISE	TRINITY	031003249	MINING	WISE	TRINITY	14,337	14,133	22,428	19,652	24,648	28,520
C51	ENNIS REUSE	INDIRECT REUSE	ELLIS	TRINITY	030192000	ENNIS	ELLIS	TRINITY	-	70	135	1,037	2,269	3,696
C56	INDIRECT REUSE	INDIRECT REUSE	DALLAS	TRINITY	030298000	IRVING	DALLAS	TRINITY	-	16,815	25,811	25,294	24,809	24,407
C56	INDIRECT REUSE	INDIRECT REUSE	PARKER	TRINITY	031002184	STEAM ELECTRIC POWER	PARKER	TRINITY	-	5,000	5,000	5,000	5,000	5,000
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	030151000	DALLAS	COLLIN	TRINITY	851	2,512	4,422	4,361	4,128	3,876
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	030151000	DALLAS	DALLAS	TRINITY	13,532	7,630	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	030151000	DALLAS	DENTON	TRINITY	396	1,125	1,928	1,868	1,748	1,602
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	031004057	IRRIGATION	DALLAS	TRINITY	264	520	616	748	802	632
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	031001057	MANUFACTURING	DALLAS	TRINITY	1,501	3,675	6,894	7,114	7,001	6,430
C50.2	PURCHASE FROM WATER PROVIDER (2)	DIRECT REUSE	DALLAS	TRINITY	031001061	MANUFACTURING	DENTON	TRINITY	24	80	177	205	224	238
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030673000	ADDISON	DALLAS	TRINITY	530	1,333	2,489	2,521	2,430	2,275
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030677000	ARGYLE	DENTON	TRINITY	740	1,835	1,618	1,312	1,458	1,687
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030033000	BALCH SPRINGS	DALLAS	TRINITY	197	427	746	712	676	645
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030820000	BARTONVILLE	DENTON	TRINITY	289	999	979	849	902	979
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034028000	BOLIVAR WSC	DENTON	TRINITY	-	-	-	-	-	1,000
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034028000	BOLIVAR WSC	DENTON	TRINITY	250	465	1,159	1,626	2,588	1,931
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030102000	CEDAR HILL	DALLAS	TRINITY	462	1,288	2,617	2,808	2,874	2,821
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030103000	CELINA	COLLIN	TRINITY	250	2,525	4,428	6,216	13,087	12,733
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030121000	COCKRELL HILL	DALLAS	TRINITY	39	91	155	146	136	124
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030766000	COMBINE	DALLAS	TRINITY	6	17	31	32	33	35
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030766000	COMBINE	KAUFMAN	TRINITY	11	30	61	69	76	83
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030133000	COPPELL	DALLAS	TRINITY	601	1,316	2,247	2,148	1,992	1,819
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030133000	COPPELL	DENTON	TRINITY	6	19	40	45	46	46

WMS Project ID	Project Name	SRC Name	SRC County Name	SRC Basin Name	WUG ID	WUG Name	WUG County Name	WUG Basin Name	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030849000	COPPER CANYON	DENTON	TRINITY	129	254	267	291	341	387
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030757057	COUNTY-OTHER	DALLAS	TRINITY	1	3	5	4	4	4
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030757061	COUNTY-OTHER	DENTON	TRINITY	1,681	3,436	2,801	2,339	747	617
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	031011000	CROSS ROADS	DENTON	TRINITY	187	616	701	859	1,336	1,755
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030151000	DALLAS	DALLAS	TRINITY	3,123	46,635	94,838	97,927	97,668	101,489
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034085000	DALLAS COUNTY WCID #6	DALLAS	TRINITY	35	102	202	217	235	252
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030161000	DE SOTO	DALLAS	TRINITY	638	1,702	3,340	3,581	3,727	3,504
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030768000	DOUBLE OAK	DENTON	TRINITY	216	333	247	194	207	232
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030171000	DUNCANVILLE	DALLAS	TRINITY	475	1,089	1,882	1,818	1,720	1,600
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030198000	FARMERS BRANCH	DALLAS	TRINITY	672	1,602	2,937	2,978	2,913	2,783
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030201000	FERRIS	ELLIS	TRINITY	-	23	18	12	9	9
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030204000	FLOWER MOUND	DENTON	TRINITY	738	1,631	2,811	2,699	2,515	2,296
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030204000	FLOWER MOUND	DENTON	TRINITY	1,232	4,844	4,575	4,253	2,903	2,941
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030697000	GLENN HEIGHTS	DALLAS	TRINITY	44	121	245	268	278	280
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030697000	GLENN HEIGHTS	ELLIS	TRINITY	16	50	109	128	143	156
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030245000	GRAND PRAIRIE	DALLAS	TRINITY	1,196	3,046	6,215	7,186	7,999	8,579
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030245000	GRAND PRAIRIE	ELLIS	TRINITY	4	39	168	275	382	499
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030245000	GRAND PRAIRIE	TARRANT	TRINITY	316	829	1,618	1,685	1,653	1,569
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034146000	GUNTER RURAL WSC	COLLIN	TRINITY	287	358	325	317	400	478
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034146000	GUNTER RURAL WSC	GRAYSON	TRINITY	51	72	74	82	141	206
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030776000	HEBRON	DENTON	TRINITY	11	35	100	190	266	262
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030776000	HEBRON	DENTON	TRINITY	17	35	38	55	82	93
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030704000	HICKORY CREEK	DENTON	TRINITY	164	375	324	292	390	533
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030294000	HUTCHINS	DALLAS	TRINITY	72	314	862	1,236	1,535	1,489
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030298000	IRVING	DALLAS	TRINITY	880	297	511	491	553	824
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034216000	JOHNSON COUNTY RURAL SUD	ELLIS	TRINITY	38	49	72	59	50	52
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034216000	JOHNSON COUNTY RURAL SUD	TARRANT	TRINITY	381	471	688	553	473	491
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030892000	KRUGERVILLE	DENTON	TRINITY	42	71	59	60	81	125
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030337000	LAKE DALLAS	DENTON	TRINITY	381	672	512	401	420	458
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030345000	LANCASTER	DALLAS	TRINITY	428	1,505	3,211	3,687	3,903	3,830
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	031001061	MANUFACTURING	DENTON	TRINITY	24	80	94	76	83	94
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	034271000	MUSTANG WSC	DENTON	TRINITY	236	628	609	570	699	876
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	031020000	NORTHLAKE	DENTON	TRINITY	327	242	309	332	396	421
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030929000	OAK LEAF	ELLIS	TRINITY	20	52	102	110	116	119
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030930000	OAK POINT	DENTON	TRINITY	143	374	353	326	397	495
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030935000	PECAN HILL	ELLIS	TRINITY	7	29	37	40	39	47
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030465000	PILOT POINT	DENTON	TRINITY	850	956	796	676	750	814
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	031021000	PONDER	DENTON	TRINITY	549	1,215	1,700	2,013	2,324	1,969
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030799000	PROSPER	COLLIN	TRINITY	498	1,133	1,087	889	942	991
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030799000	PROSPER	DENTON	TRINITY	125	336	390	425	461	496
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030521000	ROWLETT	DALLAS	TRINITY	2,620	3,251	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030547000	SEAGOVILLE	DALLAS	TRINITY	148	364	692	727	729	717
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030803000	SHADY SHORES	DENTON	TRINITY	95	198	169	148	173	210
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030981000	VALLEY VIEW	COOKE	TRINITY	135	212	230	227	382	472
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DALLAS	TRINITY	030657000	WILMER	DALLAS	TRINITY	105	254	464	484	573	854
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	034007000	ARGYLE WSC	DENTON	TRINITY	185	277	205	161	173	192
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030758000	AUBREY	DENTON	TRINITY	145	390	484	449	526	512
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	034010000	BARTONVILLE WSC	DENTON	TRINITY	20	70	74	72	89	108
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030691000	CORINTH	DENTON	TRINITY	1,419	2,397	1,881	1,542	1,639	1,806
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030159000	DENTON	DENTON	TRINITY	156	1,634	4,713	6,162	8,253	12,097
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	034089000	DENTON COUNTY FWSD	DENTON	TRINITY	374	811	745	685	826	1,027
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030249000	GRAPEVINE	TARRANT	TRINITY	120	264	456	438	408	373
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030706000	HIGHLAND VILLAGE	DENTON	TRINITY	802	1,366	1,068	849	908	1,004
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030784000	JUSTIN	DENTON	TRINITY	69	307	407	530	708	815
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030785000	KRUM	DENTON	TRINITY	76	225	220	236	266	316
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	031018000	LINCOLN PARK	DENTON	TRINITY	34	81	76	70	89	111
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	DENTON	TRINITY	030535000	SANGER	DENTON	TRINITY	1,580	1,544	1,299	1,180	1,375	1,445
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030025000	ARLINGTON	TARRANT	TRINITY	-	23,390	15,850	12,470	2,630	100
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034040000	BUENA VISTA - BETHEL SUD	ELLIS	TRINITY	-	34	75	116	97	133
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034068000	COMMUNITY WATER COMPANY	ELLIS	TRINITY	-	23	67	112	162	188
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030757070	COUNTY-OTHER	ELLIS	TRINITY	-	161	333	466	336	394
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030757107	COUNTY-OTHER	HENDERSON	TRINITY	-	38	65	56	51	49
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030757129	COUNTY-OTHER	KAUFMAN	SABINE	-	12	20	18	16	15
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030757129	COUNTY-OTHER	KAUFMAN	TRINITY	-	52	90	79	70	67
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034094000	EAST CEDAR CREEK FWSD	HENDERSON	TRINITY	-	-	-	-	820	2,481
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030192000	ENNIS	ELLIS	TRINITY	-	-	761	1,893	1,313	1,578
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030201000	FERRIS	ELLIS	TRINITY	-	4	7	11	9	9
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030213000	FORT WORTH	PARKER	TRINITY	-	3,290	4,899	4,780	5,146	4,547
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030213000	FORT WORTH	TARRANT	TRINITY	-	43,924	46,457	47,896	55,858	55,031
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030245000	GRAND PRAIRIE	DALLAS	TRINITY	-	-	764	762	884	889
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030245000	GRAND PRAIRIE	ELLIS	TRINITY	-	3	28	38	52	64
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030245000	GRAND PRAIRIE	TARRANT	TRINITY	-	-	199	179	183	163
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030699000	GUN BARREL CITY	HENDERSON	TRINITY	-	-	-	-	791	1,236
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	031004129	IRRIGATION	KAUFMAN	TRINITY	-	37	64	57	51	49
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030299000	ITALY	ELLIS	TRINITY	-	18	45	76	67	94
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030711000	KEMP	KAUFMAN	TRINITY	-	53	89	77	69	66
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030375000	MABANK	HENDERSON	TRINITY	-	23	42	40	38	40
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030375000	MABANK	KAUFMAN	TRINITY	-	184	371	385	406	465
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030383000	MALAKOFF	HENDERSON	TRINITY	-	69	127	120	118	129
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	031001070	MANUFACTURING	ELLIS	TRINITY	-	-	906	1,266	938	934
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	031001249	MANUFACTURING	WISE	TRINITY	-	-	-	-	175	1,208
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030911000	MAYPEARL	ELLIS	TRINITY	-	10	18	25	18	21
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030405000	MIDLOTHIAN	ELLIS	TRINITY	-	551	1,390	2,267	3,397	3,987
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	031003107	MINING	HENDERSON	TRINITY	-	46	79	70	63	61
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034269000	MOUNTAIN PEAK WSC	ELLIS	TRINITY	-	-	101	138	96	104
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030731000	PALMER	ELLIS	TRINITY	-	6	14	19	15	19

WMS Project ID	Project Name	SRC Name	SRC County Name	SRC Basin Name	WUG ID	WUG Name	WUG County Name	WUG Basin Name	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030935000	PECAN HILL	ELLIS	TRINITY	-	5	11	17	14	18
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030737000	RED OAK	ELLIS	TRINITY	-	50	136	240	176	208
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034409000	RICE WSC	ELLIS	TRINITY	-	14	34	49	62	71
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034325000	ROCKETT SUD	DALLAS	TRINITY	-	22	42	41	41	45
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034325000	ROCKETT SUD	ELLIS	TRINITY	-	270	493	497	507	561
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034330000	SARDIS-LONE ELM WSC	ELLIS	TRINITY	-	52	89	86	93	107
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030959000	SEVEN POINTS	HENDERSON	TRINITY	-	150	212	213	251	273
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	031002070	STEAM ELECTRIC POWER	ELLIS	TRINITY	-	49	110	133	150	160
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030753000	TOOL	HENDERSON	TRINITY	-	332	452	437	504	534
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	030633000	WAXAHACHIE	ELLIS	TRINITY	-	65	133	187	1,046	2,362
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034381000	WEST CEDAR CREEK MUD	HENDERSON	TRINITY	-	1,325	1,990	2,017	2,439	2,685
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	HENDERSON	TRINITY	034381000	WEST CEDAR CREEK MUD	KAUFMAN	TRINITY	-	1,100	1,835	2,032	2,650	3,104
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030813000	ANNA	COLLIN	TRINITY	1,045	1,290	1,468	1,717	1,747	2,584
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034024000	BLACKLAND WSC	ROCKWALL	SABINE	146	148	144	144	153	177
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034024000	BLACKLAND WSC	ROCKWALL	TRINITY	62	64	62	62	65	75
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034041000	CADDO BASIN SUD	COLLIN	SABINE	171	174	213	198	217	441
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034041000	CADDO BASIN SUD	COLLIN	TRINITY	150	180	250	300	400	400
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030103000	CELINA	COLLIN	TRINITY	243	650	1,008	1,538	1,931	2,388
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034065000	COLLEGE MOUND WSC	KAUFMAN	TRINITY	210	286	351	359	389	463
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757043	COUNTY-OTHER	COLLIN	SABINE	10	15	15	20	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757043	COUNTY-OTHER	COLLIN	TRINITY	166	97	68	43	51	44
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757091	COUNTY-OTHER	GRAYSON	RED	45	48	35	31	23	22
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757091	COUNTY-OTHER	GRAYSON	TRINITY	6	7	5	4	3	3
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757129	COUNTY-OTHER	KAUFMAN	SABINE	86	125	88	100	35	34
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757129	COUNTY-OTHER	KAUFMAN	TRINITY	384	508	175	119	158	152
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030757199	COUNTY-OTHER	ROCKWALL	TRINITY	166	224	94	79	70	67
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034083000	CULLEOKA WSC	COLLIN	TRINITY	391	408	397	387	399	440
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034096000	EAST FORK SUD	COLLIN	TRINITY	239	214	204	200	204	223
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034096000	EAST FORK SUD	DALLAS	TRINITY	50	36	29	25	23	23
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034096000	EAST FORK SUD	ROCKWALL	TRINITY	3	2	2	2	1	1
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030199000	FARMERSVILLE	COLLIN	TRINITY	244	313	353	442	576	756
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030207000	FORNEY	KAUFMAN	TRINITY	834	1,221	1,215	1,185	1,172	1,239
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034115000	FORNEY LAKE WSC	KAUFMAN	TRINITY	960	717	598	520	478	479
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034115000	FORNEY LAKE WSC	ROCKWALL	TRINITY	752	717	598	520	478	479
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030221000	FRISCO	COLLIN	TRINITY	319	8,936	9,885	9,815	9,510	6,871
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030221000	FRISCO	DENTON	TRINITY	5,401	5,666	7,833	7,216	7,242	5,554
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030230000	GARLAND	DALLAS	TRINITY	5,000	3,000	2,000	1,000	1,000	1,000
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034137000	GASTONIA-SCURRY	KAUFMAN	TRINITY	362	363	335	335	362	426
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030702000	HEATH	ROCKWALL	TRINITY	756	775	782	798	858	995
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034205000	HIGH POINT WSC	KAUFMAN	TRINITY	235	211	199	200	207	242
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034205000	HIGH POINT WSC	ROCKWALL	TRINITY	23	22	22	22	23	27
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030286000	HOWE	GRAYSON	RED	33	41	38	36	28	27
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030286000	HOWE	GRAYSON	TRINITY	154	282	344	378	325	344
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031004199	IRRIGATION	ROCKWALL	TRINITY	413	414	246	209	137	132
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031031000	JOSEPHINE	COLLIN	TRINITY	45	86	68	56	51	49
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030313000	KAUFMAN	KAUFMAN	TRINITY	498	520	492	466	458	532
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034230000	LAVON WSC	COLLIN	TRINITY	158	177	207	345	481	632
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034230000	LAVON WSC	ROCKWALL	TRINITY	144	177	184	193	212	249
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030352000	LEONARD	FANNIN	SULPHUR	-	1	2	4	5	6
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030352000	LEONARD	FANNIN	TRINITY	-	65	119	208	240	290
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030790000	LITTLE ELM	DENTON	TRINITY	2,044	2,298	2,221	1,869	1,659	1,598
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031041000	LOWRY CROSSING	COLLIN	TRINITY	134	119	113	110	112	408
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030718000	LUCAS	COLLIN	TRINITY	445	464	447	482	608	797
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031001043	MANUFACTURING	COLLIN	TRINITY	1,461	1,187	1,085	1,019	989	1,037
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031001091	MANUFACTURING	GRAYSON	RED	72	42	34	32	25	26
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031001129	MANUFACTURING	KAUFMAN	TRINITY	216	314	140	155	121	131
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031001199	MANUFACTURING	ROCKWALL	SABINE	3	4	6	7	9	10
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031001199	MANUFACTURING	ROCKWALL	TRINITY	7	12	13	12	18	18
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031042000	MCLENDON-CHISHOLM	ROCKWALL	TRINITY	84	74	71	70	72	82
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030914000	MELISSA	COLLIN	TRINITY	954	1,276	1,340	1,393	1,551	1,871
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030401000	MESQUITE	DALLAS	TRINITY	6,272	8,126	8,185	7,628	7,215	7,025
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034257000	MILLIGAN WSC	COLLIN	TRINITY	87	60	46	38	33	32
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034270000	MT ZION WSC	ROCKWALL	TRINITY	191	194	173	159	154	152
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030724000	MURPHY	COLLIN	TRINITY	669	1,758	1,412	1,181	1,049	1,010
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031045000	NEVADA	COLLIN	SABINE	76	107	103	172	254	612
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031045000	NEVADA	COLLIN	TRINITY	30	53	51	86	127	306
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030923000	NEW HOPE	COLLIN	TRINITY	116	116	154	194	258	553
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034278000	NORTH COLLIN WSC	COLLIN	TRINITY	377	338	323	313	321	352
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030928000	OAK GROVE	KAUFMAN	TRINITY	53	45	42	42	43	50
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030733000	PARKER	COLLIN	TRINITY	825	1,235	1,454	1,988	2,580	3,399
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030472000	PLANO	COLLIN	TRINITY	11,691	13,652	14,322	13,699	12,848	10,744
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030472000	PLANO	DENTON	TRINITY	583	671	585	466	431	363
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030487000	PRINCETON	COLLIN	TRINITY	287	475	680	946	1,401	2,023
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034313000	R-C-H WSC	ROCKWALL	TRINITY	176	133	115	102	97	103
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030498000	RICHARDSON	COLLIN	TRINITY	-	2,329	2,197	1,882	218	211
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030498000	RICHARDSON	DALLAS	TRINITY	6,763	5,617	5,299	4,538	5,709	5,526
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030513000	ROCKWALL	ROCKWALL	TRINITY	3,627	4,531	4,683	4,422	4,030	3,880
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030521000	ROWLETT	DALLAS	TRINITY	1,992	882	3,790	3,501	3,328	3,388
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030521000	ROWLETT	ROCKWALL	TRINITY	678	503	402	337	298	286
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030522000	ROYSE CITY	COLLIN	SABINE	135	319	410	517	612	663
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030522000	ROYSE CITY	ROCKWALL	SABINE	1,043	1,323	1,046	1,085	1,133	1,110
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030742000	SACHSE	COLLIN	TRINITY	313	354	329	290	102	89
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030742000	SACHSE	DALLAS	TRINITY	991	863	809	761	908	949
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031072000	SAINT PAUL	COLLIN	TRINITY	83	142	227	304	320	325
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034336000	SOUTH GRAYSON WSC	COLLIN	TRINITY	28	25	16	12	8	6
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	034336000	SOUTH GRAYSON WSC	GRAYSON	TRINITY	23	30	24	23	18	19
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031002057	STEAM ELECTRIC POWER	DALLAS	TRINITY	46	25	24	24	25	29
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030749000	SUNNYVALE	DALLAS	TRINITY	762	743	766	785	824	812

WMS Project ID	Project Name	SRC Name	SRC County Name	SRC Basin Name	WUG ID	WUG Name	WUG County Name	WUG Basin Name	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031065000	TALTY	KAUFMAN	TRINITY	372	408	452	494	564	693
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030599000	TERRELL	KAUFMAN	TRINITY	2,274	1,825	1,633	1,465	1,391	1,474
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030752000	THE COLONY	DENTON	TRINITY	223	200	177	153	138	134
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030619000	VAN ALSTYNE	GRAYSON	TRINITY	509	1,076	1,160	1,172	974	954
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	031069000	WESTON	COLLIN	TRINITY	192	340	582	1,462	1,950	3,153
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030669000	WYLIE	COLLIN	TRINITY	2,849	3,133	3,137	3,676	3,419	3,598
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030669000	WYLIE	DALLAS	TRINITY	57	68	71	75	82	84
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	KAUFMAN	TRINITY	030669000	WYLIE	ROCKWALL	TRINITY	49	54	55	54	55	59
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030025000	ARLINGTON	TARRANT	TRINITY	11,721	1,095	9,370	10,707	18,153	16,713
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030031000	AZLE	PARKER	TRINITY	79	190	218	244	219	239
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030031000	AZLE	TARRANT	TRINITY	360	955	1,253	1,620	1,591	1,785
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030051000	BENBROOK	TARRANT	TRINITY	649	1,402	1,655	1,814	1,988	2,317
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030062000	BLUE MOUND	TARRANT	TRINITY	19	35	32	27	23	22
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030125000	COLLEYVILLE	TARRANT	TRINITY	1,335	2,635	2,635	2,398	2,170	2,102
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	034069000	COMMUNITY WSC	TARRANT	TRINITY	70	125	119	105	95	94
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	034069000	COMMUNITY WSC	WISE	TRINITY	3	5	5	4	4	4
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030757061	COUNTY-OTHER	DENTON	TRINITY	119	267	307	319	325	352
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030757081	COUNTY-OTHER	FREESTONE	TRINITY	60	110	188	165	146	141
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030757175	COUNTY-OTHER	NAVARRO	TRINITY	21	36	61	53	47	45
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030757220	COUNTY-OTHER	TARRANT	TRINITY	573	1,007	960	843	754	728
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030757249	COUNTY-OTHER	WISE	TRINITY	149	1,126	692	692	433	423
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030692000	DALWORTHINGTON GARDENS	TARRANT	TRINITY	96	185	189	174	159	156
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030180000	EDGECLIFF	TARRANT	TRINITY	76	134	127	112	100	96
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030193000	EULESS	TARRANT	TRINITY	1,444	2,910	2,933	2,676	2,431	2,365
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030194000	EVERMAN	TARRANT	TRINITY	66	132	142	138	138	136
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030206000	FOREST HILL	TARRANT	TRINITY	294	561	573	547	532	539
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030213000	FORT WORTH	DENTON	TRINITY	155	1,898	2,686	3,377	4,656	4,942
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030213000	FORT WORTH	PARKER	TRINITY	371	-	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030213000	FORT WORTH	TARRANT	TRINITY	20,978	-	-	-	-	700
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030213000	FORT WORTH	WISE	TRINITY	62	633	857	835	1,076	1,086
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	DALLAS	TRINITY	1,029	2,002	1,225	1,226	796	802
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	ELLIS	TRINITY	3	22	26	38	28	35
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030245000	GRAND PRAIRIE	TARRANT	TRINITY	271	545	319	287	164	147
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030249000	GRAPEVINE	TARRANT	TRINITY	1,343	3,002	3,198	3,055	2,886	2,891
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030261000	HALTOM CITY	TARRANT	TRINITY	1,175	2,320	2,335	2,122	1,925	1,872
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030879000	HASLET	TARRANT	TRINITY	43	194	361	323	291	281
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030883000	HUDSON OAKS	PARKER	TRINITY	90	254	271	320	283	326
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030293000	HURST	TARRANT	TRINITY	1,061	2,004	1,988	1,802	1,647	1,611
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031004220	IRRIGATION	TARRANT	TRINITY	628	1,022	947	851	753	725
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031004249	IRRIGATION	WISE	TRINITY	21	37	35	32	29	28
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030341000	LAKE WORTH	TARRANT	TRINITY	97	197	217	218	220	225
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030384000	MANSFIELD	ELLIS	TRINITY	51	163	213	302	329	418
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030384000	MANSFIELD	TARRANT	TRINITY	5,475	11,526	11,103	12,338	10,071	8,984
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031001175	MANUFACTURING	NAVARRO	TRINITY	94	193	367	358	346	359
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031001184	MANUFACTURING	PARKER	TRINITY	194	291	254	251	195	203
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031001220	MANUFACTURING	TARRANT	TRINITY	2,842	6,053	6,775	6,942	6,964	7,298
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030405000	MIDLOTHIAN	ELLIS	TRINITY	550	-	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031003249	MINING	WISE	TRINITY	4,779	4,711	3,145	2,786	2,025	1,893
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030435000	NORTH RICHLAND HILLS	TARRANT	TRINITY	1,057	2,106	2,234	2,093	2,037	2,020
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030739000	RENO	PARKER	TRINITY	15	27	26	23	22	24
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030499000	RICHLAND HILLS	TARRANT	TRINITY	193	363	369	350	327	321
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030505000	RIVER OAKS	TARRANT	TRINITY	166	292	274	240	215	208
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030527000	SAGINAW	TARRANT	TRINITY	475	1,048	1,131	1,093	1,035	1,038
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030539000	SANSOM PARK VILLAGE	TARRANT	TRINITY	30	55	54	47	43	43
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031002070	STEAM ELECTRIC POWER	ELLIS	TRINITY	20	-	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031002081	STEAM ELECTRIC POWER	FREESTONE	TRINITY	1,606	1,991	3,438	3,059	2,743	2,634
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031002220	STEAM ELECTRIC POWER	TARRANT	TRINITY	647	957	1,132	1,244	1,371	1,616
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031002249	STEAM ELECTRIC POWER	WISE	TRINITY	1,098	2,592	2,167	2,653	2,094	1,975
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030634000	WEATHERFORD	PARKER	BRAZOS	68	127	122	133	117	129
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030634000	WEATHERFORD	PARKER	TRINITY	1,323	2,556	2,400	2,543	2,210	2,396
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	031070000	WESTOVER HILLS	TARRANT	TRINITY	46	81	78	70	62	60
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030644000	WESTWORTH VILLAGE	TARRANT	TRINITY	40	85	85	79	77	82
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE	NAVARRO	TRINITY	030651000	WHITE SETTLEMENT	TARRANT	TRINITY	280	538	570	516	512	545
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030008000	ALLEN	COLLIN	TRINITY	5,968	7,366	7,568	6,916	6,359	6,170
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	034086000	DANVILLE WSC	COLLIN	TRINITY	364	349	346	348	363	405
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030772000	FAIRVIEW	COLLIN	TRINITY	741	693	720	904	1,338	2,253
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030230000	GARLAND	DALLAS	TRINITY	13,387	14,119	11,779	10,065	9,766	9,465
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	031001057	MANUFACTURING	DALLAS	TRINITY	2,792	2,173	1,910	1,727	1,620	1,569
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030379000	MCKINNEY	COLLIN	TRINITY	1,423	7,827	11,623	14,942	16,030	13,533
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030401000	MESQUITE	DALLAS	TRINITY	5,000	3,000	2,000	1,000	1,000	1,000
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030498000	RICHARDSON	COLLIN	TRINITY	-	476	-	-	-	-
C50.2	PURCHASE FROM WATER PROVIDER (2)	INDIRECT REUSE LAVON	COLLIN	TRINITY	030498000	RICHARDSON	DALLAS	TRINITY	1,310	1,149	-	-	-	-
C21.7	TRA 10-MILE CREEK REUSE PROJECT	DIRECT REUSE	DALLAS	TRINITY	031004057	IRRIGATION	DALLAS	TRINITY	125	125	125	125	125	125
C21.7	TRA 10-MILE CREEK REUSE PROJECT	DIRECT REUSE	ELLIS	TRINITY	031004070	IRRIGATION	ELLIS	TRINITY	125	125	125	125	125	125
C21.1	TRA DALLAS COUNTY REUSE	INDIRECT REUSE	DALLAS	TRINITY	031002057	STEAM ELECTRIC POWER	DALLAS	TRINITY	-	3,000	3,000	3,000	3,000	3,000
C21.5	TRA DENTON CREEK WWTP REUSE	DIRECT REUSE	DENTON	TRINITY	031004061	IRRIGATION	DENTON	TRINITY	-	3,750	3,750	3,750	3,750	3,750
C21.5	TRA DENTON CREEK WWTP REUSE	DIRECT REUSE	TARRANT	TRINITY	031004220	IRRIGATION	TARRANT	TRINITY	3,750	3,750	3,750	3,750	3,750	3,750
C21.2	TRA ELLIS COUNTY REUSE	DIRECT REUSE	ELLIS	TRINITY	031002070	STEAM ELECTRIC POWER	ELLIS	TRINITY	10,000	10,000	10,000	10,000	20,000	20,000
C21.2	TRA ELLIS COUNTY REUSE	INDIRECT REUSE	ELLIS	TRINITY	031002070	STEAM ELECTRIC POWER	ELLIS	TRINITY	10,000	10,000	20,000	20,000	20,000	20,000
C21.3	TRA FREESTONE COUNTY REUSE	INDIRECT REUSE	FREESTONE	TRINITY	031002081	STEAM ELECTRIC POWER	FREESTONE	TRINITY	-	-	10,000	10,000	20,000	20,000
C21.4	TRA KAUFMAN COUNTY REUSE	INDIRECT REUSE	KAUFMAN	TRINITY	031002129	STEAM ELECTRIC POWER	KAUFMAN	TRINITY	-	7,500	15,000	15,000	15,000	15,000
C21	TRA LAS COLINAS REUSE	INDIRECT REUSE	DALLAS	TRINITY	031004057	IRRIGATION	DALLAS	TRINITY	-	7,000	7,000	7,000	7,000	7,000
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	DALLAS	TRINITY	030355000	LEWISVILLE	DENTON	TRINITY	-	-	-	-	-	-
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	HENDERSON	TRINITY	030025000	ARLINGTON	TARRANT	TRINITY	-	-	-	-	-	-
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	HENDERSON	TRINITY	030375000	MABANK	KAUFMAN	TRINITY	-	-	-	-	-	-
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	NAVARRO	TRINITY	030025000	ARLINGTON	TARRANT	TRINITY	-	-	-	-	-	-
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	NAVARRO	TRINITY	030031000	AZLE	TARRANT	TRINITY	-	-	-	-	-	-
C53.1-R	WATER TREATMENT PLANT-EXPANSION- REUSE SOURCES	INDIRECT REUSE	NAVARRO	TRINITY	034069000	COMMUNITY WSC	TARRANT	TRINITY	-	-	-	-	-	-
C53-R	WATER TREATMENT PLANT-NEW- REUSE SOURCES	INDIRECT REUSE	NAVARRO	TRINITY	030031000	AZLE	TARRANT	TRINITY	-	-	-	-	-	-
C21.8	WAXAHACHIE/TRA INDIRECT REUSE	INDIRECT REUSE	ELLIS	TRINITY	031001070	MANUFACTURING	ELLIS	TRINITY	31	87	282	455	605	685
C21.8	WAXAHACHIE/TRA INDIRECT REUSE	INDIRECT REUSE	ELLIS	TRINITY	030633000	WAXAHACHIE	ELLIS	TRINITY	3,081	2,876	2,402	1,950	1,520	1,161
Total									281,678	521,697	656,615	670,297	708,562	723,159

Appendix 3D

Region H Drought
Contingency Plans

This Page Intentionally
Left Blank

Table 3D-1
Major Water Provider Drought Triggers

MWP	Drought Type	Trigger Condition			Time requirement	Actions	
BRA		**Local Reservoirs**	**System Reservoirs**			**Local Reservoirs**	**System Reservoirs**
	Watch	Storage is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months	Storage of the Authority system is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months		Condition lasts 30 consecutive days	Inform/meet with customers, urge activation of drought contingency plans, prepare/initiate specific drought response plan, activate storage in Federal reservoirs	Inform/meet with customers, urge activation of drought contingency plans, prepare/initiate specific drought response plan, activate storage in Federal reservoirs
	Warning	Storage is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months	Storage of the Authority system is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months		Condition lasts 30 consecutive days	Inform/meet with customers, require activation of drought contingency plans, evaluate alternative actions, update specific drought reponse plan, activate storage in Federal reservoirs	Inform/meet with customers, require activation of drought contingency plans, evaluate alternative actions, update specific drought reponse plan, activate storage in Federal reservoirs
	Emergency	Storage is < Stage 3 Trigger level	Storage of the Authority system is < Stage 3 Trigger level		Condition lasts 30 consecutive days	Continue Stage 1 & 2 actions, additional actions as deemed necessary	Continue Stage 1 & 2 actions, additional actions as deemed necessary
GCWA		**Brazos River - Hempstead Gauge**	**Brazos River - Richmond Gauge**				
	Mild	14.00 ft or 2200 cfs	12.19 ft or 1700 cfs		Condition ceases for 30 consec. days	Notify BRA, monitor situation daily	
	Moderate	13.71 ft or 2000 cfs	11.93 ft or 1500 cfs		Condition ceases for 30 consec. days	Alert customers, increase maintenance	
	Watch	13.41 ft or 1800 cfs	11.65 ft or 1300 cfs		Condition ceases for 30 consec. days	Request stored water releases, if needed	
	Warning	12.93 ft or 1500 cfs	11.23 ft or 1000 cfs		Condition ceases for 30 consec. days	Request stored water releases	
	Emergency	GCWA delivery or storage system outage, or extreme fire flows (industrial) that temporarily interrupts service to customers.			Until condition corrected	Notify customers, minimize service interruptions while making repairs	

Table 3D-1
Major Water Provider Drought Triggers

MWP	Drought Type	Trigger Condition			Time requirement	Actions	
Houston		**Lakes Conroe, Houston & Livingston**	**Municipal water demand / production**	**Municipal water distribution system**			
	Mild	Combined storage = 24 months surface water supply	Average production = 80% of combined surface and ground water capacity	Average system pressure is 45 psi	Condition lasts 10 consecutive days	Inform the public and request voluntary reductions	
	Serious	Combined storage = 18 months surface water supply	Average production = 85% of combined surface and ground water capacity	Average system pressure is 40 psi	Condition lasts 10 consecutive days	Ban non-essential outdoor use and listed water waste	
	Critical	Combined storage = 12 months surface water supply	Average production = 90% of combined surface and ground water capacity	Average System pressure is 35 psi	Condition lasts 10 consecutive days	Ban all outdoor use and listed water waste	
SJRA		**Lake Conroe**	**Woodlands GW System**			**Lake Conroe**	**GW System**
	Mild	Elev < 198 ft (85% capacity)	Combined Pumpage > 75% of capacity for 3 days, Plant operator's call based on usage and weather		Condition ceases for 7 days	Request voluntary conservation	Voluntary conservation, increased leak repair
	Moderate	Elev < 190 ft (55% capacity)	Combined pumpage > 85% of capacity for 3 days, or 90% of capacity for 1 day, or 95% of 1 plant for 3 days, or storage does not recover to 70% capacity overnight		Condition ceases for 7 days	Weekly customer meetings, mandatory conservation	Odd/even watering cycle, cease fountains and non-fire hydrant use
	Severe	Elev < 185 ft (40% capacity)	Combined pumpage > 90% of capacity for 3 days, or 95% of capacity for 1 day, or 95% of 1 plant for 3 days, or storage does not recover to 50% capacity overnight		Condition ceases for 7 days	Additional mandatory or pro-rata use reductions, look for alternate sources	2-day watering cycle, ban other outdoor use, reduce system pressure during peak periods
	Critical	Delivery system failure or supply contamination	Delivery system failure or supply contamination		Until condition corrected	Inform customers, make specific response based on situation	Ban all uses but for health and safety, isolate elevated storage for fire reserve

Table 3D-1
Major Water Provider Drought Triggers

MWP	Drought Type	Trigger Condition			Time requirement	Actions	
TRA		**Huntsville RWSS**	**Livingston RWSS**	**Trinity County RWSS**			
	Mild	Demand > 6 MGD for 30 days	Demand > 2 MGD for 15 days	Wellfield or plant capacity <1000 gpm, or use 5% > allocation	Condition ceases to exist for 5 days	Voluntary reductions, monthly updates	
	Moderate	Demand > 7 MGD for 20 days	Demand > 2.25 MGD for 10 days	Wellfield or plant capacity <850 gpm, or use 15% > allocation	Condition ceases to exist for 5 days	Ban non-esential use, prep pro-rata reduction plan	
	Severe	Demand > 7.5 MGD for 10 days	Demand > 2.5 MGD for 5 days	Wellfield or plant capacity <700 gpm, or use 25% > allocation	Condition ceases to exist for 5 days	Initiate pro-rata reduction plan	
	Emergency	Major system failure (>50% of delivery capacity lost) or supply contamination	Major system failure (>50% of delivery capacity lost) or supply contamination	Major system failure (>50% of delivery capacity lost) or supply contamination	Until condition corrected	Inform customers, make specific response based on situation	
TRA		**Lake Livingston / Wallisville System**					
	Mild	Lake Livingston elev < 126.50 ft at USGS gage			Condition ceases to exist for 5 days	Modify gate operations, voluntary reductions, monthly updates	
	Moderate	Lake Livingston elev < 124.00 ft at USGS gage			Condition ceases to exist for 5 days	No new contracts, initiate mandatory reductions and pro-rata curtailments	
	Severe	Lake Livingston elev < 121.40 ft at USGS gage			Condition ceases to exist for 5 days	Terminate supply to low-priority customers, additional mandatory reductions	
	Emergency	Major system failure (>50% of delivery capacity lost) or supply contamination			Until condition corrected	Inform customers, make specific response based on situation	

Table 3D-2
Source-Specific Drought Triggers
Established by Major Water Providers

Water Source	Drought Type	Trigger Condition	Time Requirement		Established By	Actions
			Initiation	Termination		
Trinity River						
Lake Livingston	Mild	Combined storage (Lakes Livingston, Conroe & Houston) is less than 24 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Inform the public and request voluntary reductions
	Serious	Combined storage (Lakes Livingston, Conroe & Houston) is less than 18 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Ban non-essential outdoor use and listed water waste
	Severe	Combined storage (Lakes Livingston, Conroe & Houston) is less than 12 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Ban all outdoor use and listed water waste
Lake Livingston / Wallisville System	Mild	Lake Livingston elev < 126.50 ft at USGS gage	Condition exists for one day	Condition ceases to exist for 5 days	TRA	Modify gate operations, voluntary reductions, monthly updates
	Moderate	Lake Livingston elev < 124.00 ft at USGS gage	Condition exists for one day	Condition ceases to exist for 5 days	TRA	No new contracts, initiate mandatory reductions and pro-rata curtailments
	Severe	Lake Livingston elev < 121.40 ft at USGS gage	Condition exists for one day	Condition ceases to exist for 5 days	TRA	Terminate supply to low-priority customers, additional mandatory reductions

Table 3D-2
Source-Specific Drought Triggers
Established by Major Water Providers

Water Source	Drought Type	Trigger Condition	Time Requirement		Established By	Actions
			Initiation	Termination		
San Jacinto River						
Lake Conroe	Mild	Elev < 198 ft (85% of storage capacity)	Condition exists for one day	Condition ceases for 7 days	SJRA	Request voluntary conservation
	Moderate	Elev < 190 ft (55% of storage capacity)	Condition exists for one day	Condition ceases for 7 days	SJRA	Weekly customer meetings, mandatory conservation
	Severe	Elev < 185 ft (40% of storage capacity)	Condition exists for one day	Condition ceases for 7 days	SJRA	Additional mandatory or pro-rata use reductions, look for alternate sources
Lake Houston	Mild	Combined storage (Lakes Livingston, Conroe & Houston) is less than 24 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Inform the public and request voluntary reductions
	Serious	Combined storage (Lakes Livingston, Conroe & Houston) is less than 18 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Ban non-essential outdoor use and listed water waste
	Severe	Combined storage (Lakes Livingston, Conroe & Houston) is less than 12 months surface water supply	Condition exists 10 consecutive days	Condition ceases for 30 consecutive days	Houston	Ban all outdoor use and listed water waste

Table 3D-2
Source-Specific Drought Triggers
Established by Major Water Providers

Water Source	Drought Type	Trigger Condition	Time Requirement		Established By	Actions
			Initiation	Termination		
Brazos River						
Hempstead Gauge	Mild	14.00 ft or 2200 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Notify BRA, monitor situation daily
	Moderate	13.71 ft or 2000 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Alert customers, increase maintenance
	Watch	13.41 ft or 1800 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Request stored water releases, if needed
	Warning	12.93 ft or 1500 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Request stored water releases
Richmond Gauge	Mild	12.19 ft or 1700 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Notify BRA, monitor situation daily
	Moderate	11.93 ft or 1500 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Alert customers, increase maintenance
	Watch	11.65 ft or 1300 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Request stored water releases, if needed
	Warning	11.23 ft or 1000 cfs	Condition exists for one day	Condition ceases for 30 consec. days	GCWA	Request stored water releases
BRA Local Reservoirs	Watch	Storage is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Inform/meet with customers, urge activation of drought contingency plans, prepare/initiate specific drought response plan, activate storage in Federal reservoirs
	Warning	Storage is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Inform/meet with customers, require activation of drought contingency plans, evaluate alternative actions, update specific drought reponse plan, activate storage in Federal reservoirs
	Emergency	Storage is < Stage 3 Trigger level	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Continue Stage 1 & 2 actions, additional actions as deemed necessary

Table 3D-2
Source-Specific Drought Triggers
Established by Major Water Providers

Water Source	Drought Type	Trigger Condition	Time Requirement		Established By	Actions
			Initiation	Termination		
BRA System Reservoirs	Watch	Storage of the Authority system is < Stage 1 Trigger level and could be reduced to Stage 2 Trigger or less during the next 12 months	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Inform/meet with customers, urge activation of drought contingency plans, prepare/initiate specific drought response plan, activate storage in Federal reservoirs
	Warning	Storage of the Authority system is < Stage 2 Trigger level and could be reduced to Stage 3 Trigger or less during the next 12 months	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Inform/meet with customers, require activation of drought contingency plans, evaluate alternative actions, update specific drought reponse plan, activate storage in Federal reservoirs
	Emergency	Storage of the Authority system is < Stage 3 Trigger level	Condition exists for one day	Condition ceases for 30 consecutive days	BRA	Continue Stage 1 & 2 actions, additional actions as deemed necessary
Gulf Coast Aquifer	Local triggers based on pumping/delivery system limits, not aquifer levels.					
Carrizo-Wilcox Aquifer	Local triggers based on pumping/delivery system limits, not aquifer levels.					
Sparta Aquifer	Local triggers based on pumping/delivery system limits, not aquifer levels.					
Queen City Aquifer	Local triggers based on pumping/delivery system limits, not aquifer levels.					
Brazos River Alluvium	Local triggers based on pumping/delivery system limits, not aquifer levels.					

Appendix 3E

Potential Reservoir Sites

This Page Intentionally
Left Blank

Region H
Table 3E: Previously Studied Potential Reservoir Sites

LARGE RESERVOIR SITES (OVER 50,000 ACRE-FEET)								
Reservoir / River Basin	Yield, Acre-Feet	Reference	Recommended Project in the 2007 Texas State Water Plan	Recommended Unique Site in the 2007 Texas State Water Plan	Original Cost at Dam, Million $	Reference	Comments	Reference
Allens Creek Brazos Basin	99,650	10	Yes	No (see comments)	$169.0 in 1997	6	This project has been designated as a unique reservoir site by the Texas Legislature. A water right permit has been granted to the BRA and City of Houston. Detailed design and environmental studies are on-going.	
	70,000	7			$143.3 in 1995	5		
Bedias Trinity Basin	90,732	4	No	Yes	$50.7 in 1975	12	This project has been designated as a unique reservoir site by the Texas Legislature. Some endangered species have been identified. There are 24,675 acres lost of which 7,328 acres of bottomland hardwoods and 15,327 units of wildlife habitats are lost. Included in Region C Water Plan for TRA.	3
	70,705	2			$50.8 in 1975	7		
	84,370	1					Site is listed in the Trinity River Basin Master Plan.	11
Cleveland San Jacinto Basin	65,900		No	No	$76.5 in 1975	7	Some endangered species have been identified. There are 11,485 acres lost of which 2,330 acres of bottomland hardwoods and 4,845 units of wildlife habitats are lost. Alternative site in the 1997 Texas Water Plan.	3
(Lower) Lake Creek San Jacinto Basin	53,767	4	No	No	$65.5 in 1975	7	Some endangered species have been identified. There are 10,904 acres lost of which 2,200 acres of bottomland hardwoods and 6,195 units of wildlife habitats are lost. Site is listed in COH Master Plan.	3, 4
	67,213	12			$275.0 in 1990	12		
	73,012	2						
Little River Brazos Basin	129,000	8	No	Yes			Also included in Brazos G Regional Water Plan. This project has been designated as a unique reservoir site by the Texas Legislature.	8
Little River - Off Channel Brazos Basin	32,110	8	Yes	Yes	96.0 in 2001		Also included in Brazos G Regional Water Plan. This project has been designated as a unique reservoir site by the Texas Legislature.	8
Millican/Panther Creek Brazos Basin	252,032	4	No	No	$318.0 in 1971	7	Some endangered species have been identified. There are 63,410 acres lost of which 26,730 acres of bottomland hardwoods and 29,323 units of wildlife habitats are lost. Reservoir site also included in Brazos G Regional Water Plan.	3, 9
	248,600	2						
	252,225	12						
	235,200	8						
Millican/Bundic Crossing Brazos Basin	73,800	8	No	No			Formerly called Millican-Peach Creek. The site contains a large lignite deposit. Also included in Brazos G Regional Water Plan.	9
Tehuacana Trinity Basin	282,500	12	No	Yes	$156.0 in 1995	5	A few endangered species have been identified. There are 14,804 acres lost of which 6,993 acres of bottomland hardwoods and 9,093 units of wildlife habitats are lost. This site contains a lignite deposit. Site is listed in the Trinity River Basin Master Plan and Region C Water Plan.	3, 9, 11
	61,068	1						

Table 3E: Previously Studied Potential Reservoir Sites

	68,300	5						
Tennessee Colony Trinity Basin	405,492	4	No	No	$509.0 in 1970	6	This project is large enough to be a regional water source possibility. Some endangered species have been identified. There are 85,053 acres lost of which 34,767 acres of bottomland hardwoods and 43,031 units of wildlife habitats are lost. A large lignite deposit is also on site. Site is listed in the Trinity River Basin Master Plan. The water rights are seior to Livingston rights and would impact current available supply.	3, 11
	405,802	12						
	997,112	5						
SMALLER RESERVOIR SITES (UNDER 50,000 ACRE-FEET)								
Reservoir/ River Basin	Yield, Acre-Feet	Reference	Recommended Project in the 2002 Texas State Water Plan	Recommended Unique Site in the 2002 Texas State Water Plan	Original Cost at Dam, Million $	Reference	Comments	Reference
Big Elkhart Creek Trinity Basin	12,320	11	No	No	N/A		Site is listed in the Trinity River Basin Master Plan.	11
Caney Trinity Basin	15,694	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	25,880	4						
Gail Creek Trinity Basin	19,040	11	No	No	N/A		Site is listed in the Trinity River Basin Master Plan.	11
Harmons Trinity Basin	10,089	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	11,809	1						
Humble San Jacinto Basin	N/A		No	No	N/A		Alternative site in the 1997 Texas Water Plan. There are 35,800 acres of affected area.	7
Hurricane Trinity Basin	17,936	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	16,546	1						
Liberty	N/A	7	No	No	N/A		Capers Ridge site from 1956 TRA Master Plan. Site now permitted for the Luce Bayou Pump station	11
Long King Trinity Basin	20,178	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	34,869	1						
Lower Keechie Trinity Basin	25,783	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	28,513	1						
Mustang Trinity Basin	15,694	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	24,890	1						

Region H
Table 3E: Previously Studied Potential Reservoir Sites

Navasota Brazos Basin	N/A				$196 in 1968	7	Original site had 58,180 acres of affected area. This location is now in the tail-water of the proposed Millican-Bundic Crossing Reservoir.	7
Nelsons Trinity Basin	17,936	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	8,849	1						
Oak Knoll Brazos Basin	N/A		No	No	N/A		Original site had 4,302 acres of affected area. This location is now in the tail-water of the proposed Millican-Bundic Crossing Reservoir.	7
Spring Creek Lake San Jacinto Basin	7,500		No	No	N/A			7
	26,900	4						
Upper Keechi Trinity Basin	15,694	12	No	No	N/A		Site is listed in the Trinity River Basin Master Plan. Alternative site in the 1997 Texas Water Plan.	11
	16,317	1						
Upper Lake Creek San Jacinto Basin			No	No	N/A		Alternative site in the 1997 Texas Water Plan.	

REFERENCES:

1 1986. Trinity River Yield Study Phase III: Yield Analysis. By Espey, Huston & Associates, Inc.
2 1988. San Jacinto River Authority Water Resources Development Plan-Water Supply Plan, Pate Engineers, Inc.
3 1990 (Texas Parks & Wildlife Dept.), and (U.S. Fish & Wildlife Service). Texas Water and Wildlife. A Natural Resource Survey for
4 1991. Houston Water Master Plan, Appendix L, Table 2-8, revised by Metcalf & Eddy.
5 1996. Memorandum Report Updated Water Project Opinions of Cost. Freese and Nichols, Inc.
6 1997. Trans-Texas Water Program Southeast Area, Operation Studies and Opinions of Cost for Allens Creek Reservoir Volume I - Text.
7 1997. Water for Texas, A Concensus-Based Update to the State Water Plan, TWDB
8 2001. Brazos G Regional Water Plan
9 2001. Region C Water Plan
10 2001. Region H Water Plan
11 2003. Trinity River Basin Master Plan, Update
12 Additional information collected in 1999 from River Authorities

Appendix 3F

Water Quality Basin Maps

This Page Intentionally
Left Blank

Explanation of Water Quality Indicator Icons Used on the Basin Maps

Basin maps are provided as a quick reference to the general location of classified segments within the basin. Icons are used to indicate the presence of threatened, partially supported, and nonsupported designated uses and water quality concerns.

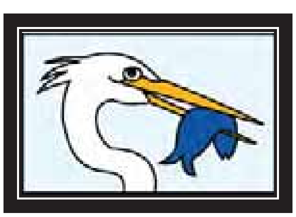
Conceptual Icon

Blue bar identifies segment number

Internal symbol identifies indicator used to assess a use or concern

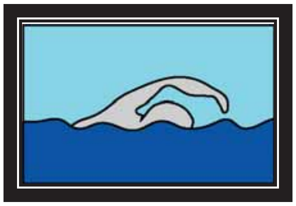
Border color indicates level of use support or presence of water quality concern. Green = threatened use, yellow = partially supported use, red = nonsupported use, and orange = water quality concern.

Icons for Designated Uses



Aquatic Life

A specific subcategory of aquatic life use (exceptional, high, intermediate, limited, or minimal) is assigned to each water body for protection and propagation of desirable fish, benthic macroinvertebrates, and other aquatic biota. Support of the use is determined by four indicators (dissolved oxygen criteria, acute and chronic toxic substances in water criteria, ambient water and sediment toxicity test results, and fish and macrobenthos data).



Contact Recreation

The contact recreation use is assigned to water bodies where recreational activities including wading by small children, swimming, water skiing, diving, and surfing commonly occur. Support of the use is determined by bacterial indicators (fecal coliform or *E. coli*).

Noncontact Recreation

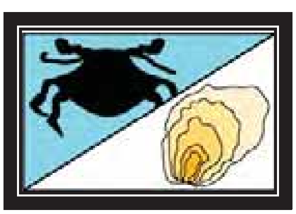
A noncontact recreation use is primarily assigned to water bodies where ship and barge traffic or other activities make contact recreation unsafe. Recreational activities such as boating that do not involve a significant risk of water ingestion are allowed. Support of the use is determined by bacterial indicators (fecal coliform or *E. coli*).

General Use

Water temperature, pH, chloride, sulfate, total dissolved solids and enterococci bacteria indicators are used to determine support of general water quality, rather than a specific use.

Fish Consumption

The fish consumption use is assigned to all water bodies to ensure that fish and shellfish is safe for human consumption. Support of the use is determined by human health criteria in water (to protect against bioacumulation of toxic substances) and issuance of consumption advisories and aquatic life closures by the Texas Department of Health.



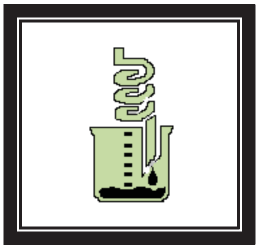
Oyster Waters

The oyster waters use is assigned to estuarine water bodies that are suitable for harvesting shellfish. Support of the use is determined from maps developed by the Texas Department of Health that depict the classification of shellfish growing areas.

Public Water Supply

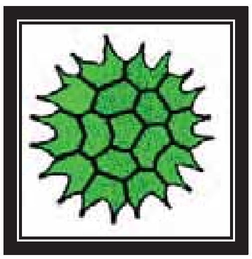
A public water supply use is assigned to all water bodies that are used as a supply for public drinking water. The use is designed to ensure that finished drinking water (after treatment) is safe for consumption. Primary organic substances in finished drinking water is the indicator used to determine support of the use.

Icons for Water Quality Concerns



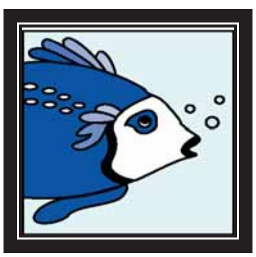
Nutrient Enrichment

Elevated concentrations of nutrients from point and nonpoint sources may contribute to excessive eutrophication in a water body. Nutrient enrichment concerns are determined by four indicators (ammonia and nitrite + nitrate nitrogen, orthophosphorus, and total phosphorus). Statewide 85th percentile concentrations by water body type are used to identify water bodies with nutrient enrichment concerns.



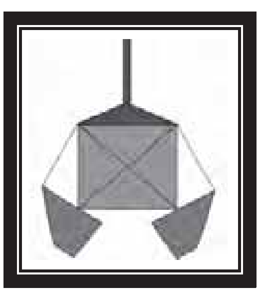
Chlorophyll a

Elevated concentrations of chlorophyll *a* signal potential problems associated with excessive algal growths. Algal blooms may occur in response to elevated nutrient concentrations. Statewide 85th percentile concentrations by water body type are used to identify water bodies with chlorophyll *a* concerns.



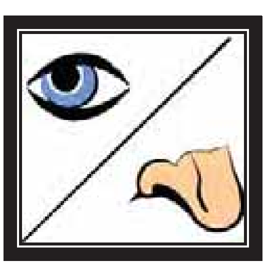
Fish Tissue

Elevated concentrations metals and organic substances in fish tissue signal potential health risks to humans and other organisms that consume fish in their diets. Screening levels slightly below those used by the Texas Department of Health to establish consumption advisories are used to identify fish consumption concerns.



Sediment

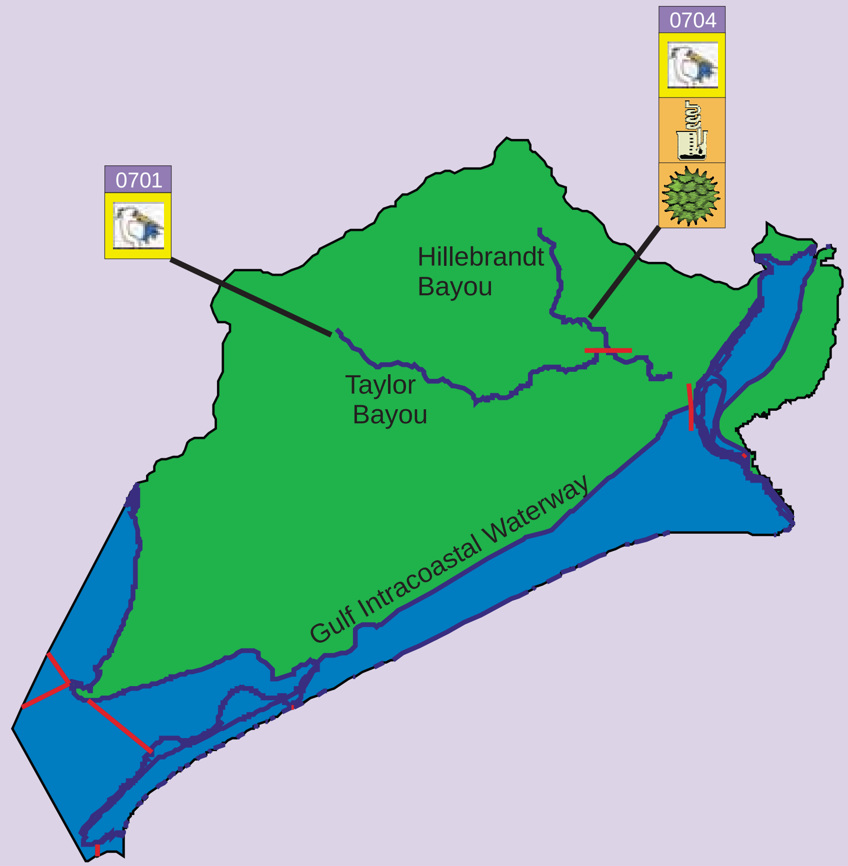
Elevated concentrations of metals and organic substances in sediment may contribute to water quality problems when they are re-suspended by wind activity and spring and fall overturn in deep reservoirs. Metals in sediment may be released into the water column when changes in pH occur near the sediment-water interface. Contaminated sediments may also affect small creatures such as worms, crustaceans, and insect larvae that live directly in the bottoms of water bodies. Statewide 85th percentile concentrations by water body type, threshold effects levels (TELS), and probable effect levels (PELS), are indicators used to identify sediment concerns.

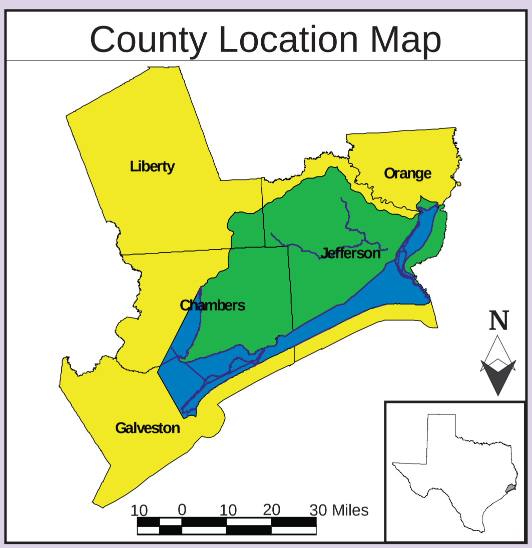


Narrative Criteria

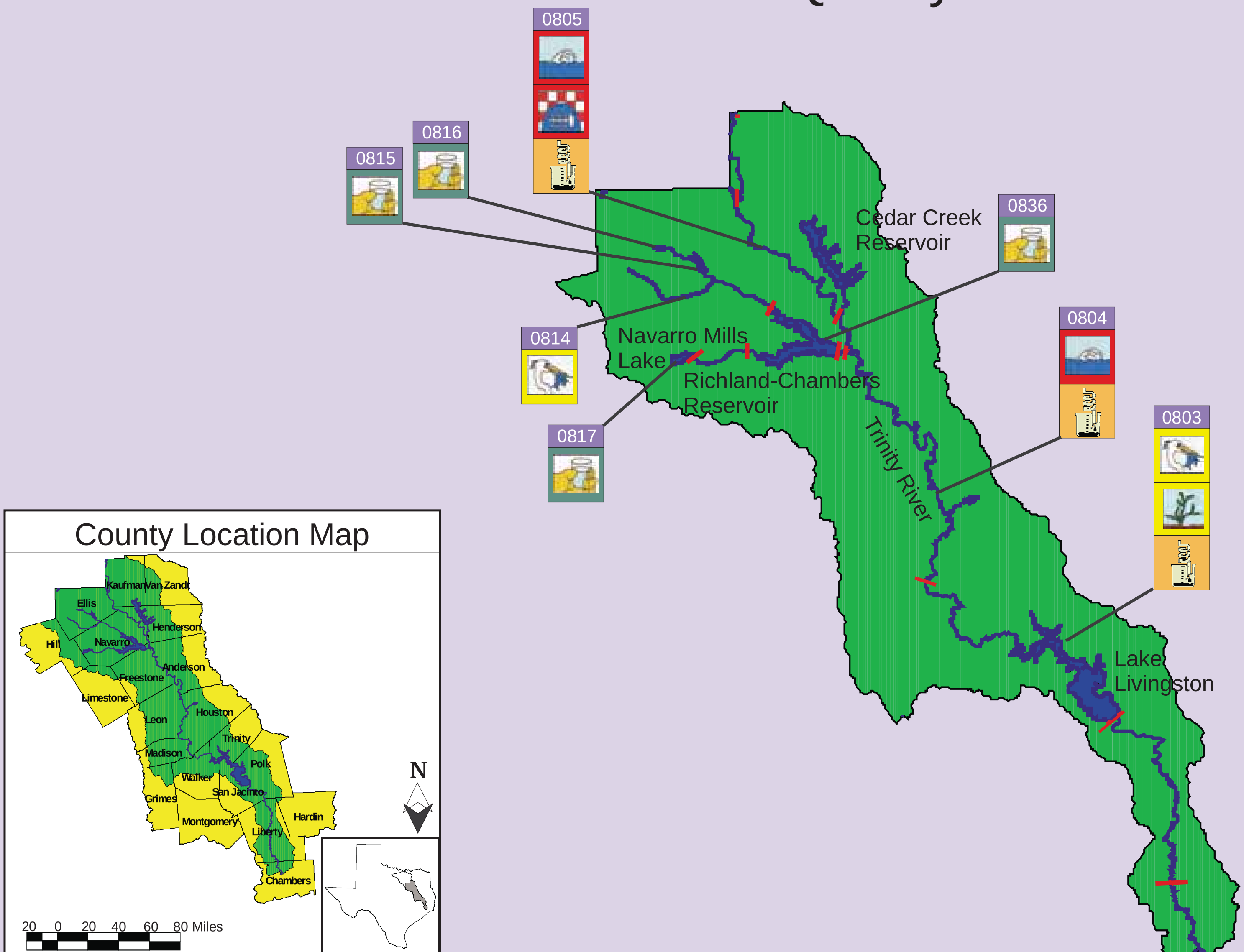
Narrative criteria concerns are identified in water bodies where activities or substances impair taste, odor, color, and other aesthetic qualities.

Neches-Trinity Coastal Basin
Identified Water Quality Issues

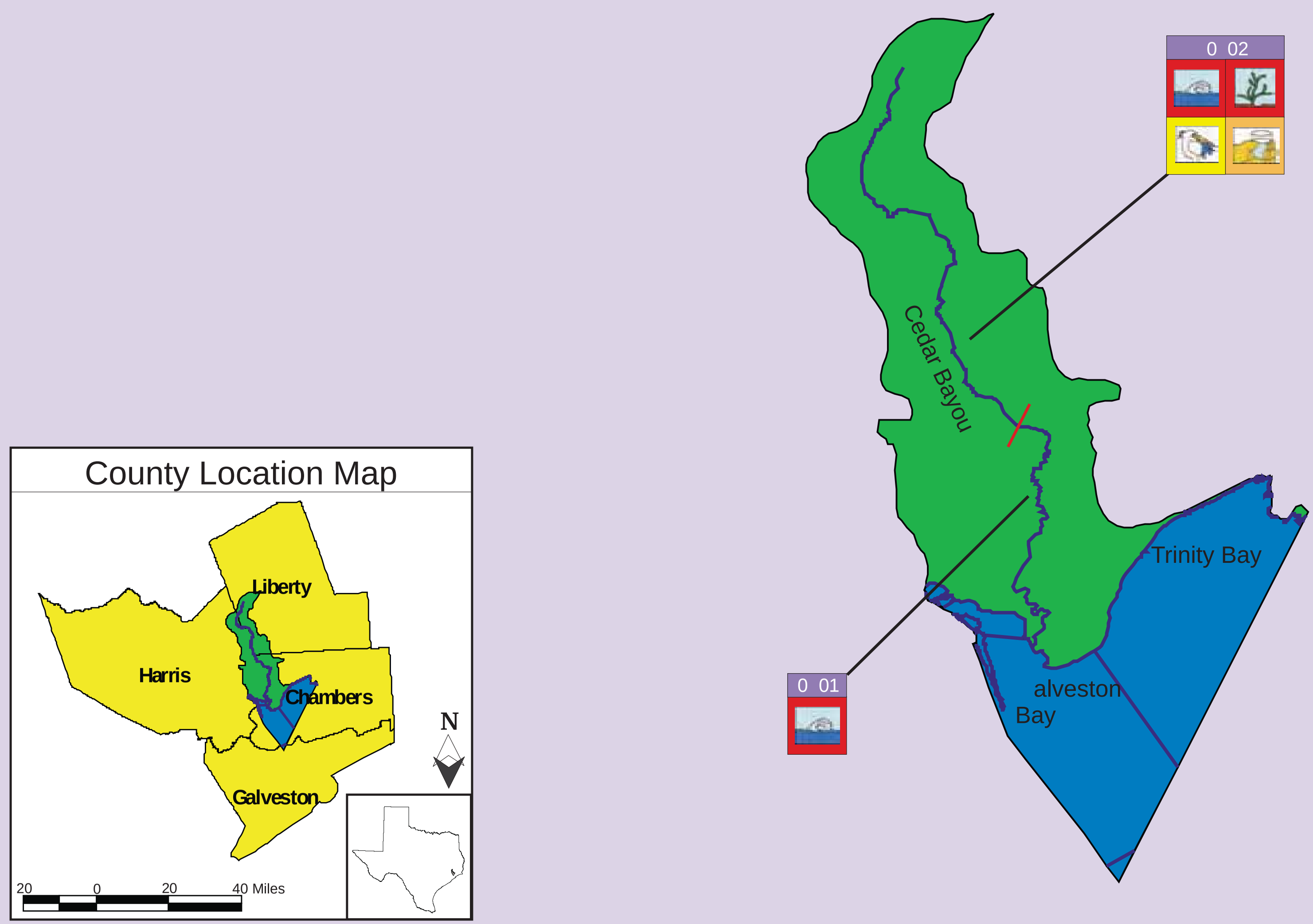




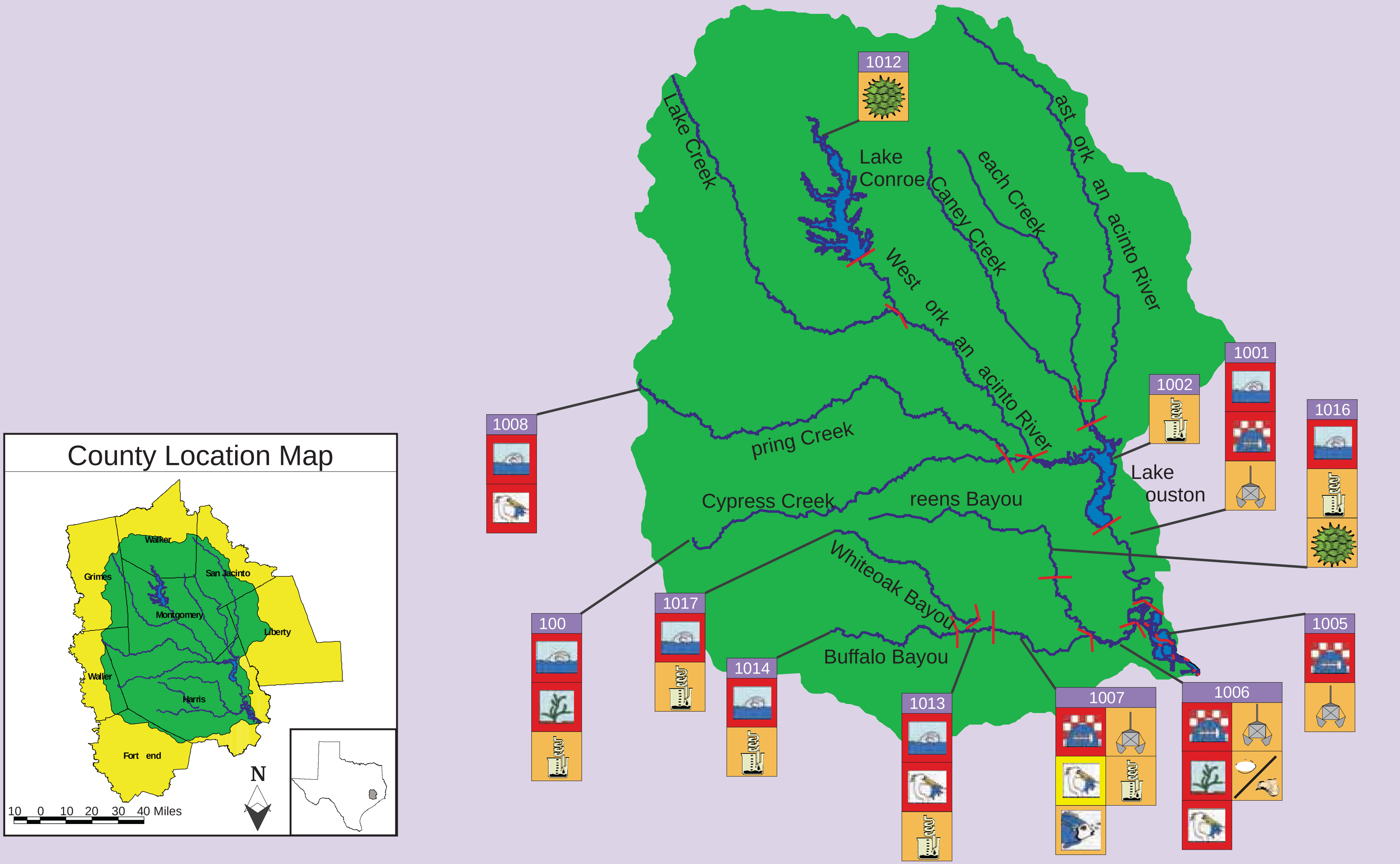
Lower Trinity River Basin
Identified Water Quality Issues

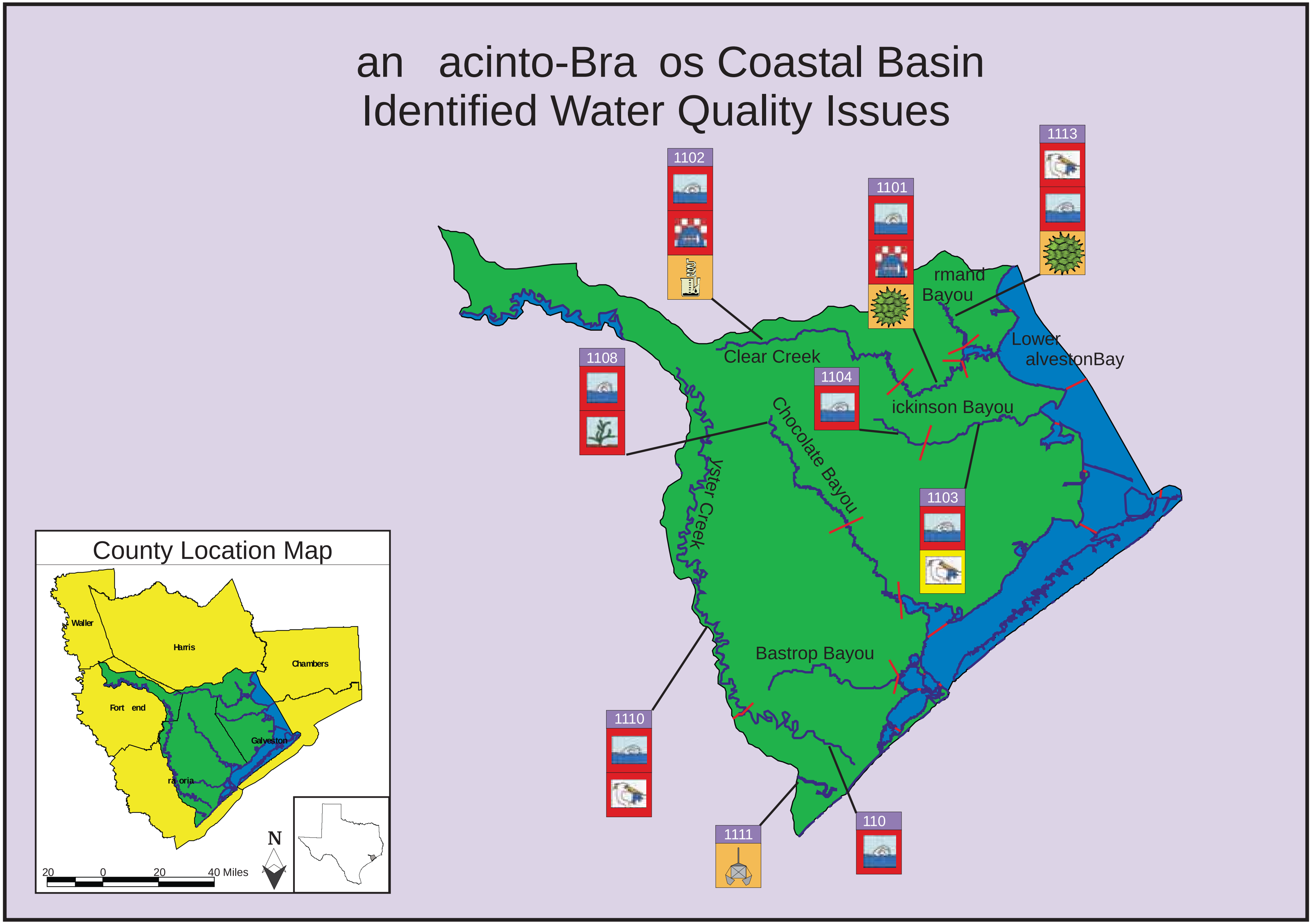


Trinity- an acinto Coastal Basin
Identified Water Quality Issues

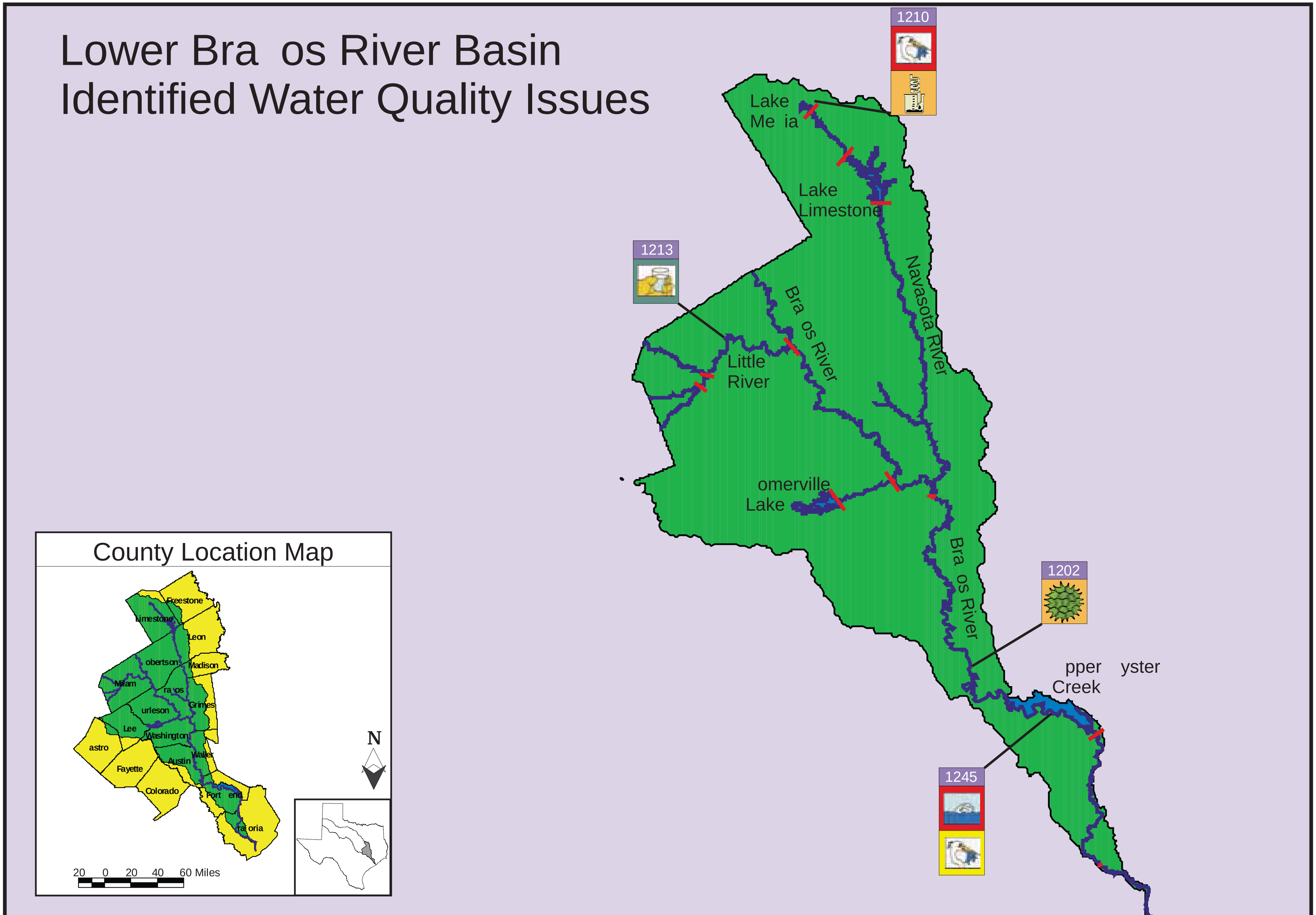


an acinto River Basin
Identified Water Quality Issues

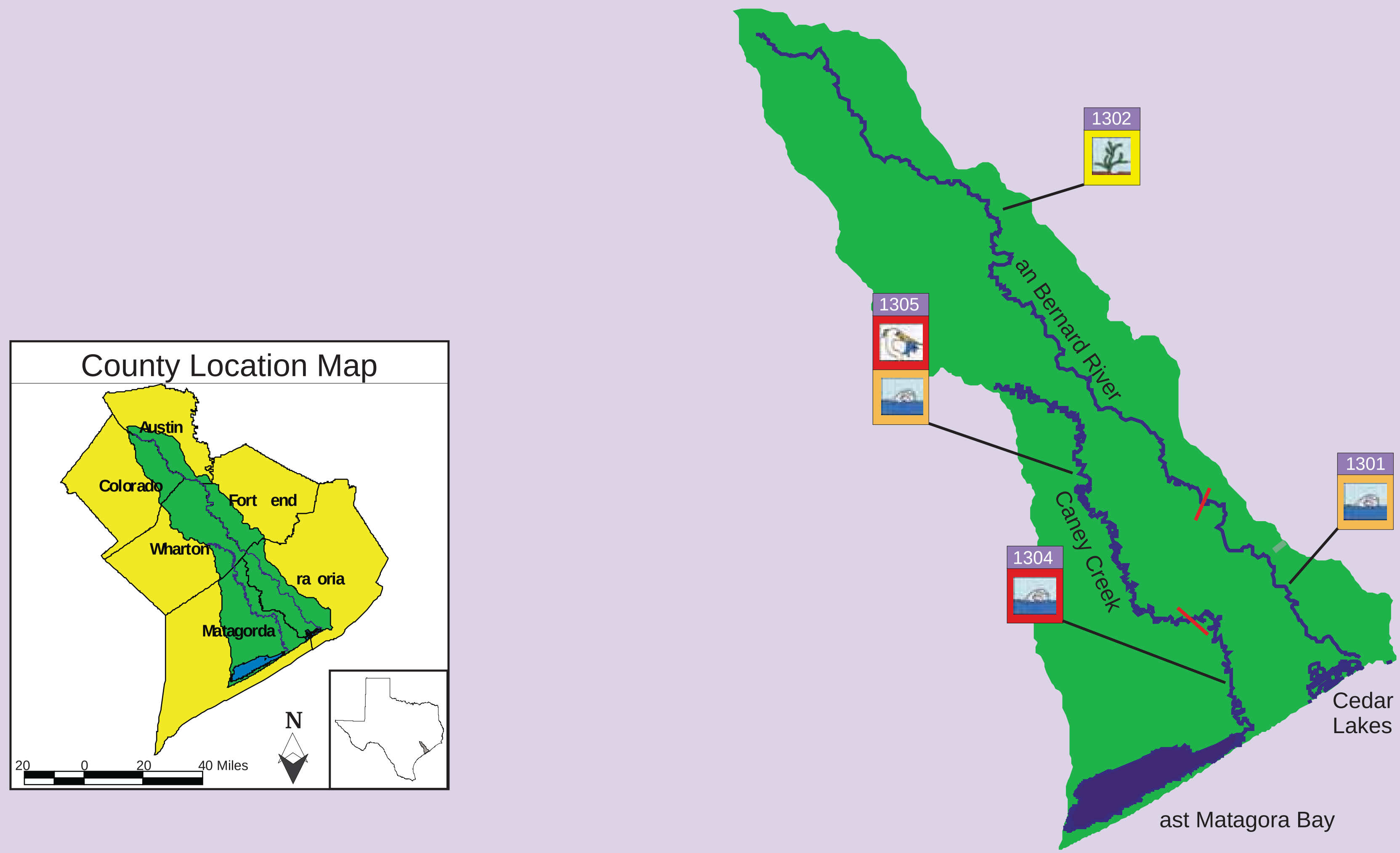



an acinto-Bra os Coastal Basin
Identified Water Quality Issues
1102
1101
1113
1108
1104
1103
1110
1111
110
Clear Creek
rmand
Bayou
Lower
alvestonBay
ickinson Bayou
Chocolate Bayou
yster Creek
Bastrop Bayou
County Location Map
Waller
Harris
Chambers
Fort end
Galveston
ra oria
N
20
0
20
40 Miles

Lower Bra os River Basin
Identified Water Quality Issues



Bra os-Colorado Coastal Basin
Identified Water Quality Issues



Appendix 3G

Region H Recreational Use Information

This Page Intentionally
Left Blank

Region H
Table 3G-1: River Segments, Bays and Estuaries

	Segment	Recreation[1]	Aquatic Life	Water Supply	Uses	Boating & Water Sports	Camping & Picnicking	Fishing	Hunting	Nature & Wildlife Viewing	Restrooms & Showers	Campsite Sewage	Visitor Center
Neches-Trinity Coastal Basin													
702	Intracoastal Waterway Tidal	Contact	High		Navigation								
Trinity River Basin													
801	Trinity River Tidal	Contact	High		B	+	+			+			
802	Trinity River below Lake Livingston	Noncontact	High	Public	B, Sp	+	+			+			
803	Lake Livingston	Contact	High	Public	E, Mun, In, Ir, Rec	+	+	+		+	r/s	D	
804	Trinity River above Lake Livingston	Noncontact	High		E, Sp	+	+			+			
Trinity-San Jacinto Coastal Basin													
901	Cedar Bayou Tidal	Noncontact			Sufficient	S/R+		+		+			
902	Cedar Bayou aboveTidal	Noncontact	High	Public	Sufficient	S/R							
San Jacinto River Basin													
1001	San Jacinto River Tidal	Contact	High										
1002	Lake Houston	Contact	High	Public	Mun, In, Ir, Mi, Rec								
1003	East Fork San Jacinto River	Contact	High	Public		S/R+							
1004	West Fork San Jacinto River	Contact	High	Public		+	+						
1005	Houston Ship Channel/San Jacinto River Tidal	Noncontact	High		Sp		d+	-		+	r		+
1006	Houston Ship Channel Tidal	Noncontact		Industrial	Navigation, Sp		d+	-		+	r		+
1007	Houston Ship Channel/ Buffalo Bayou Tidal	Noncontact		Industrial	Navigation			-					
1008	Spring Creek	Noncontact	High	Public		S/R+							
1009	Cypress Creek	Noncontact	High	Public									
1010	Caney Creek	Contact	High	Public									
1011	Peach Creek	Noncontact	High	Public									
1012	Lake Conroe	Contact	High	Public	Mun, In, Mi								
1013	Buffalo Bayou Tidal	Noncontact	Intermediate			S/R+							
1014	Buffalo Bayou above Tidal	Noncontact	Limited			S/R+							
1015	Lake Creek	Contact	High	Public									
1016	Greens Bayou above Tidal	Noncontact	Limited										
1017	White Oak Bayou above Tidal	Noncontact	Limited										
San Jacinto-Brazos Coastal Basin													
1101	Clear Creek Tidal	Noncontact	High		Sufficient	S/R		-		+			
1102	Clear Creek above Tidal	Noncontact	High			S/R		-					
1103	Dickinson Bayou Tidal	Noncontact	High		Virgin Coastal Prairie					+			
1104	Dickinson Bayou above Tidal	Noncontact	Intermediate		Insufficient	S/R							
1105	Bastrop Bayou Tidal	Noncontact	High		Sufficient usually, B, Sp	S/R+		+	+	+			
1107	Chocolate Bayou Tidal	Contact	High			+							
1108	Chocolate Bayou above Tidal	Noncontact	High										
1109	Oyster Creek Tidal	Noncontact	High		Sufficient	S/R							
1110	Oyster Creek above Tidal	Noncontact	High	Public		S/R							

Region H
Table 3G-1: River Segments, Bays and Estuaries

Segment		Special Features
Neches-Trinity Coastal Basin		(Anahuac National WMA, Moody National WMA, Candy Abshier WMA)
702	Intracoastal Waterway Tidal	
Trinity River Basin		(Keechi Creek WMA, Menard Creek Unit of Big Thicket National Preserve)
801	Trinity River Tidal	Extensive freshwater wetland habitat, Prime spawning area for striped bass restoration
802	Trinity River below Lake Livingston	Prime spawning area for striped bass restoration, Unique state holdings (Davis Hill State Park), USFWS
803	Lake Livingston	Paddlefish stocking area
804	Trinity River above Lake Livingston	Paddlefish stocking area, Unique state holding (Richland Creek WMA, Big Lake Bottom WMA)
Trinity-San Jacinto Coastal Basin		
901	Cedar Bayou Tidal	
902	Cedar Bayou aboveTidal	
San Jacinto River Basin		(Sheldon WMA)
1001	San Jacinto River Tidal	
1002	Lake Houston	Lake Houston State Park
1003	East Fork San Jacinto River	Sam Houston National Forest, bottomland hardwood habitats
1004	West Fork San Jacinto River	
1005	Houston Ship Channel/San Jacinto River Tidal	Unique state holdings (San Jacinto State Park)
1006	Houston Ship Channel Tidal	Unique state holdings (San Jacinto State Park)
1007	Houston Ship Channel/ Buffalo Bayou Tidal	
1008	Spring Creek	bottomland hardwood habitats
1009	Cypress Creek	bottomland hardwood habitats
1010	Caney Creek	
1011	Peach Creek	bottomland hardwood habitats
1012	Lake Conroe	
1013	Buffalo Bayou Tidal	
1014	Buffalo Bayou above Tidal	
1015	Lake Creek	
1016	Greens Bayou above Tidal	bottomland hardwood habitats 9aobe Hwy 90)
1017	White Oak Bayou above Tidal	
San Jacinto-Brazos Coastal Basin		(Galveston Island State Park, Bryan Beach State Park, Christmas Bay State Park, Atkinson Island WMA, Christmas Bay Coastal Preserve)
1101	Clear Creek Tidal	
1102	Clear Creek above Tidal	
1103	Dickinson Bayou Tidal	
1104	Dickinson Bayou above Tidal	
1105	Bastrop Bayou Tidal	Extensive freshwater wetland habitat, Unique Federal Holdings (Brazoria National Wildlife Refuge
1107	Chocolate Bayou Tidal	
1108	Chocolate Bayou above Tidal	
1109	Oyster Creek Tidal	
1110	Oyster Creek above Tidal	

Region H
Table 3G-1: River Segments, Bays and Estuaries

	Segment	Recreation[1]	Aquatic Life	Water Supply	Uses	Boating & Water Sports	Camping & Picnicking	Fishing	Hunting	Nature & Wildlife Viewing	Restrooms & Showers	Campsite Sewage	Visitor Center
1111	Old Brazos River Channel Tidal	Contact	High										
1113	Armand Bayou Tidal	Noncontact	High		Unspoiled Vegetation, B	S/R				+			
Brazos River Basin													
1201	Brazos River Tidal	Contact	High	Public	B, E			-					
1202	Brazos River below Navasota River	Noncontact	High	Public	B, E, Sp		+	+		+	r/s	D	+
1209	Navasota River below Lake Limestone	Contact	High	Public	B	S/R				+			
1245	Upper Oyster Creek	Contact	Intermediate	Public									
1252	Lake Limestone	Contact	High	Public	Mun, In, Ir, Rec	+	+	+					
Brazos-Colorado Coatal Basin													
1301	San Bernard River Tidal	Noncontact	High		E, Rec, Sp			+	+	+			
1302	San Bernard River above Tidal	Contact	High		E, Rec, Sp					+			+
Bays and Estuaries													
2421	Upper Galveston Bay	Contact	High		Oyster Waters	+	+	-	+	+			
2422	Trinity Bay	Contact	High		Oyster Waters	+	+	+		+			
2423	East Bay	Contact	High		Oyster Waters	+		+		+			
2424	West Bay	Contact	High		Oyster Waters	+	+	+		+			
2425	Clear Lake	Noncontact	High			+	+						
2426	Tabbs Bay	Noncontact	High			+	+	-		+			
2427	San Jacinto Bay	Contact	High					-					
2428	Black Duck Bay	Contact	High					-					
2429	Scott Bay	Noncontact	High					-					
2430	Burnett Bay	Contact	High					-					
2431	Moses Lake	Contact	High			+				+			
2432	Chocolate Bay	Contact	High		Oyster Waters	+							
2433	Bastrop Bay/Oyster Lake	Contact	High		Oyster Waters	+							
2434	Christmas Bay	Contact	High		Oyster Waters	+	+	+					
2435	Drum Bay	Contact	High		Oyster Waters								
2436	Barbours Cut	Contact	High			+		-					
2437	Texas City Ship Channel	Noncontact	High			+		+		+			
2438	Bayport Channel	Noncontact	High			+		+					
2439	Lower Galveston Bay	Contact	High		Oyster Waters	+		+		+			
2442	Cedar Lakes	Contact	High		Oyster Waters			+	+	+			

B Biological Function — Mun Municipal — Mi Mining — d day use only — + this recreation activity is available in this area
E Unique Communities — Ir Irrigation — FH fish hatchery — r restrooms — - not recommended
Rec recreation — In Industry — S/R Seasonal and Restrictive — s showers
Sp Acquisition/Mitigation/Governmental Open Space — D dump

For the specific feature refered to by the symbols (B, E, and Sp) above see Sheet "Special Features"

[1] The information used for this column was obtained from the Texas Commission for Environmental Quality "The State of Texas Water Quality Inventory: Surface Water Quality Monitoring Program" Volumes 1-4 published in December 1996, and the Texas Clean Rivers Program & TNRCC "Texas Water Quality: A Summary of River Basin Assessments" published in December 1996.
The complete bibliography is attached after the tables.

Region H
Table 3G-1: River Segments, Bays and Estuaries

	Segment	Special Features
1111	Old Brazos River Channel Tidal	
1113	Armand Bayou Tidal	Extensive freshwater wetland habitat, Armand Bayou Nature Center
Brazos River Basin		(Mill Creek-Unique community, rare gamagrass-switchgrass bottomland tallgrass prairie (Austin Co.))
1201	Brazos River Tidal	striped bass spawning migration, unique community, Live oak-Water oak-Pecan bottomlands
1202	Brazos River below Navasota River	striped bass spawning migration, unique community, Live oak-Water oak-Pecan bottomlands, unique state holdings (Brazos Bend State Park)
1209	Navasota River below Lake Limestone	striped bass spawning migration
1245	Upper Oyster Creek	
1252	Lake Limestone	
Brazos-Colorado Coatal Basin		(Peach Point WMA)
1301	San Bernard River Tidal	Unique community, Live Oak-Water Oak-Pecan bottomlands, Recreation, Unique Federal holdings (San Bernard NWR)
1302	San Bernard River above Tidal	Unique community, Live Oak-Water Oak-Pecan bottomlands, Recreation, Unique Federal holdings (Attwater Prairie Chicken NWR)
Bays and Estuaries		
2421	Upper Galveston Bay	
2422	Trinity Bay	
2423	East Bay	Anahuac National Wildlife Refuge
2424	West Bay	Brazoria National Wildlife Refuge
2425	Clear Lake	
2426	Tabbs Bay	
2427	San Jacinto Bay	
2428	Black Duck Bay	
2429	Scott Bay	
2430	Burnett Bay	
2431	Moses Lake	
2432	Chocolate Bay	
2433	Bastrop Bay/Oyster Lake	
2434	Christmas Bay	
2435	Drum Bay	
2436	Barbours Cut	
2437	Texas City Ship Channel	
2438	Bayport Channel	
2439	Lower Galveston Bay	
2442	Cedar Lakes	

B Biological Function
E Unique Communities
Rec recreation
Sp Acquisition/Mitigation/Governmental Open Spac
For the specific feature refered to by the symbols (E

[1] The information used for this column was obtaine
Volumes 1-4 published in December 1996, and the
The complete bibliography is attached after the tabl

Region H
Table 3G-2: Recreational Areas

Area	County	Boating & Water Sports	Camping & Picnicking	Fishing	Hunting	Nature & Wildlife Viewing	Restrooms & Showers	Campsite Sewage	Exhibit Center
Wildlife Refuges									
Anahuac NWR	Chambers	+		+	+	+	r		
Attwater Prairie Chicken NWR	in Colorado, but borders Austin					+			+
Brazoria NWR	Brazoria	+		+	+	+			
San Bernard NWR	Brazoria			+	+	+			
Trinity River NWR	Liberty					+			
Big Thicket National Preserve	Liberty, Polk					+	r		+
Lakes & Reservoirs									
Addicks Reservoir	Harris		d+	+		+	r		+
Anahuac Lake	Chambers								
Barker Reservoir	Harris		d+	+		+	r		
Brazoria Reservoir	Brazoria								
Eagle Nest Lake	Brazoria								
Galveston County Industrial Water Res.	Galveston								
HL&P Cooling Lake	Chambers								
Harris Reservoir	Brazoria								
Lake Charlotte	Chambers								
Lake Conroe	Montgomery, Walker	+	+	+					
Lake Houston	Harris								
Lake Limestone	Leon	+		+			r		
Lake Livingston	Polk, San Jacinto, Trinity, Walker	+	+	+		+	r/s	D	
Lewis Creek Reservoir	Montgomery								
Lost Lake	Chambers								
Manor Lake	Brazoria								
Moon Lake	Brazoria								
Mustang Lake East & Mustang Lake West	Brazoria								
Old River Lake	Chambers								
San Bernard Reservoir 1, 2, 3	Brazoria								
Sheldon Reservoir	Harris	+	d+	+					
Smithers Lake	Fort Bend								
Wallisville Reservoir	Chambers, Liberty	+		+	+	+			+
National Forests									
Davy Crockett National Forest	Trinity	+	+	+		+	r	D	+
Sam Houston National Forest	Montgomery, San Jacinto, Walker	+	+	+	+	+	r	D	+

Region H
Table 3G-2: Recreational Areas

Area	Uses / Special Features
Wildlife Refuges	
Anahuac NWR	geese, waterfowl, peregrine falcon, bald eagle, alligator, mottled duck, wood stork, least tern
Attwater Prairie Chicken NWR	attwater prairie chicken, bald eagle, white-tailed hawk, wood stork, migrating geese
Brazoria NWR	wintering waterfowl(snow geese, ducks), migratory birds, marsh and water birds(roseate spoonbills, great blue herons, white ibis, sandhill cranes)
San Bernard NWR	migrating waterfowl, snow geese
Trinity River NWR	wintering, migrating, and breeding waterfowl, wetland dependent wildlife
Big Thicket National Preserve	Central and Mississippi Migratory Flyways
Lakes & Reservoirs	
Addicks Reservoir	
Anahuac Lake	Ir, In, Mi
Barker Reservoir	
Brazoria Reservoir	In
Eagle Nest Lake	
Galveston County Industrial Water Res.	In, Mun
HL&P Cooling Lake	In
Harris Reservoir	In
Lake Charlotte	Cypress swamp
Lake Conroe	Mun, In, Mi
Lake Houston	Mun, In, Ir, Mi, Rec, Lake Houston State Park, Eisenhower park, Duessen Park
Lake Limestone	Mun, In, Ir
Lake Livingston	Mun, In, Ir
Lewis Creek Reservoir	In
Lost Lake	
Manor Lake	
Moon Lake	
Mustang Lake East & Mustang Lake West	Ir, In, Rec
Old River Lake	
San Bernard Reservoir 1, 2, 3	In
Sheldon Reservoir	Rec, FH
Smithers Lake	In
Wallisville Reservoir	Mun, In, Ir
National Forests	
Davy Crockett National Forest	endangered species: red-cockaded woodpecker hunting: squirrel, deer, quail, dove, turkey, and waterfowl Big Slough Wilderness Area, Ratcliff Lake Rec Area, Four C Rec Trail, additional riding trails
Sam Houston National Forest	endangered species: red-cockaded woodpecker hunting: white-tailed deer, feral hog, waterfowl, dove, migratory gamebirds, squirrel, quail, rabbits, predators, fur bearers, and frogs

Region H
Table 3G-2: Recreational Areas

Area	County	Boating & Water Sports	Camping & Picnicking	Fishing	Hunting	Nature & Wildlife Viewing	Restrooms & Showers	Campsite Sewage	Exhibit Center
Parks & Preserves									
Stephen F. Austin State Park	Austin		+	+	+	+	r/s	D+	+
Bryan Beach State Park	Brazoria	+	+	+					
Christmas Bay Coastal Preserve	Brazoria	+		+	+	+			
Christmas Bay State Park	Brazoria	+	+	+		+			
Peach Point Wildlife Mgmt. Area	Brazoria		+		+	+			
Varner-Hogg State Park	Brazoria		+				r		+
Candy Abshier WMA	Chambers		d			+			
Brazos Bend State Park	Fort Bend		+	+		+	r/s	D	+
Galveston Island State Park	Galveston	+	+	+		+	r/s	D	
Armand Bayou Coastal Preserve	Harris	+	d	+		+	r		+
Atkinson Island WMA	Harris	+	d		?	+			
Lake Houston State Park	Harris, Montgomery		+			+	r/s		
San Jacinto State Historical Park	Harris		d+	+		+	r		+
Sheldon Lake State Park and Wildlife Management Area	Harris	+	d+	+		+			
Keechi Wildlife Management Area	Leon	+	+	+	+	+			
W.G. Jones State Forest	Montgomery					+			
Lake Livingston Sate Park	Polk	+	+	+		+	r/s	D	
Alabama Creek WMA	Trinity		+	+	+	+	r		
Huntsville State Park	Walker	+	+	+		+	r/s	D	+

Rec Recreation — In Industry — d day use only — + this recreation activity is available in this area
Mun Municipal — Mi Mining — r restrooms — - not recommended
Ir Irrigation — FH Fish hatchery — s showers

To see the types of animals that live in certain parks, and which animals can be hunted refer to the sheet "Special Features"

The complete bibliography is attached after the tables.

Region H
Table 3G-2: Recreational Areas

Area	Uses / Special Features
Parks & Preserves	
Stephen F. Austin State Park	
Bryan Beach State Park	
Christmas Bay Coastal Preserve	migratory and resident waterfowl, shorebirds, finfish, designated a nursery area by the TPWD, unaltered habitat
Christmas Bay State Park	
Peach Point Wildlife Mgmt. Area	oak/hackberry motte and grassland typical of the Gulf Coast Prairies, hunting: waterfowl, rail, gallinule, snipe, and feral hogs
Varner-Hogg State Park	
Candy Abshier WMA	spring migration- bird "fall out"
Brazos Bend State Park	
Galveston Island State Park	
Armand Bayou Coastal Preserve	migratory and resident waterfowl, American alligator, osprey, bluestem, little bluestem, designated a nursery area by the TPWD, unaltered habitat
Atkinson Island WMA	shore and wading birds, racoons, and rattlesnakes
Lake Houston State Park	
San Jacinto State Historical Park	
Sheldon Lake State Park and Wildlife Management Area	last fresh water marsh within greater Houston city limits, deer, raccoon, mink, opossum, rabbit, alligator, bald eagles, ducks, geese, and other waterfowl, heron/egret rookeries, Florida bass, crappie, sunfish, and catfish
Keechi Wildlife Management Area	hunting: white-tailed deer, feral hog, squirrel, rabbit, hare, waterfowl, woodcock, gallinule and snipe
W.G. Jones State Forest	endangered species: red-cockaded woodpecker
Lake Livingston Sate Park	
Alabama Creek WMA	endangered species: red-cockaded woodpecker hunting: white-tailed deer, feral hog, waterfowl, dove, migratory gamebirds, squirrel, quail, rabbits, predators, fur bearers, and frogs
Huntsville State Park	bottomland hardwood habitats

Rec Recreation
Mun Municipal
Ir Irrigation
To see the types of animals that live in certai

The complete bibliography is attached after t

Appendix 3H

Current Water Supplies Available to Region H by City and Category

This Page Intentionally
Left Blank

Region H

Table 3H.1: Current Water Supplies Available to Region H by City and Category

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year) 2010	2020	2030	2040	2050	2060
BELLVILLE	080048000	H	BRAZOS	AUSTIN	008	12	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	1192	1192	1192	1192	1192	1192
COUNTY-OTHER	080757008	H	BRAZOS	AUSTIN	008	12	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	1047	871	762	692	659	624
COUNTY-OTHER	080757008	H	BRAZOS-COLORADO	AUSTIN	008	13	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	281	281	281	281	281	281
COUNTY-OTHER	080757008	H	COLORADO	AUSTIN	008	14	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	COLORADO	AUSTIN	14	008	26	26	26	26	26	26
IRRIGATION	081004008	H	BRAZOS	AUSTIN	008	12	IRR		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	743	743	743	743	743	743
IRRIGATION	081004008	H	BRAZOS-COLORADO	AUSTIN	008	13	IRR		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	9874	9874	9874	9874	9874	9874
LIVESTOCK	081005008	H	BRAZOS	AUSTIN	008	12	LIV		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	1211	1211	1211	1211	1211	1211
LIVESTOCK	081005008	H	BRAZOS-COLORADO	AUSTIN	008	13	LIV		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	339	339	339	339	339	339
LIVESTOCK	081005008	H	COLORADO	AUSTIN	008	14	LIV		None	Groundwater	GULF COAST AQUIFER	00815	H	COLORADO	AUSTIN	14	008	13	9	7	6	5	4
LIVESTOCK	081005008	H	COLORADO	AUSTIN	008	14	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99714008	H	COLORADO	AUSTIN	14	008	52	56	58	59	60	61
MANUFACTURING	081001008	H	BRAZOS	AUSTIN	008	12	MAN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	172	172	172	172	172	172
MANUFACTURING	081001008	H	BRAZOS-COLORADO	AUSTIN	008	13	MAN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	38	38	38	38	38	38
MINING	081003008	H	BRAZOS	AUSTIN	008	12	MIN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	40	40	40	40	40	40
MINING	081003008	H	BRAZOS-COLORADO	AUSTIN	008	13	MIN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	4	4	4	4	4	4
MINING	081003008	H	COLORADO	AUSTIN	008	14	MIN		None	Groundwater	GULF COAST AQUIFER	00815	H	COLORADO	AUSTIN	14	008	7	7	7	7	7	7
SAN FELIPE	080954000	H	BRAZOS	AUSTIN	008	12	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	124	124	124	124	124	124
SEALY	080549000	H	BRAZOS	AUSTIN	008	12	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS	AUSTIN	12	008	1275	1275	1275	1275	1275	1275
WALLIS	080630000	H	BRAZOS-COLORADO	AUSTIN	008	13	MUN		None	Groundwater	GULF COAST AQUIFER	00815	H	BRAZOS-COLORADO	AUSTIN	13	008	178	178	178	178	178	178
ALVIN	080013000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3123	3123	3123	3123	3123	3123
ANGLETON	080018000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	1815	1815	1815	1815	1815	1815
ANGLETON	080018000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	125	125	125	125	125	125
BAILEY'S PRAIRIE	080817000	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	15	15	15	15	15	15
BAILEY'S PRAIRIE	080817000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	75	75	75	75	75	75
BRAZORIA	080072000	H	BRAZOS	BRAZORIA	020	12	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	82	82	82	82	82	82
BRAZORIA	080072000	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	254	254	254	254	254	254
BRAZORIA COUNTY MUD #1	084030000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	842	842	842	842	842	842
BRAZORIA COUNTY MUD #2	084031000	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	1115	1115	1115	1115	1115	1115
BRAZORIA COUNTY MUD #3	084032000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	603	603	603	603	603	603
BRAZORIA COUNTY MUD #4	084033000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	578	570	562	558	558	558
BRAZORIA COUNTY MUD #5	084034000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	680	669	659	653	653	653
BROOKSIDE VILLAGE	080078000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	266	266	266	266	266	266
CLUTE	080118000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	1120	1120	1120	1120	1120	1120
CLUTE	080118000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	27	27	27	27	27	27
COUNTY-OTHER	080757020	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	119	8	6	5	4	3
COUNTY-OTHER	080757020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	224	224	224	224	224	224
COUNTY-OTHER	080757020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	2026	2026	2026	2026	2026	2026
COUNTY-OTHER	080757020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	196	196	196	196	196	196
COUNTY-OTHER	080757020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	4588	4588	4588	4588	4588	4588
DANBURY	080693000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	211	211	211	211	211	211
FREEPORT	080217000	H	BRAZOS	BRAZORIA	020	12	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	141	117	101	90	80	72
FREEPORT	080217000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	1763	1787	1803	1814	1824	1832
HILLCREST	080881000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	125	125	125	125	125	125
HOLIDAY LAKES	080779000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	92	91	90	89	90	92
IOWA COLONY	080885000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	108	108	108	108	108	108
IRRIGATION	081004020	H	BRAZOS	BRAZORIA	020	12	IRR		None	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205492	H	BRAZOS	BRAZORIA	12	020	1800	1800	1800	1800	1800	1800
IRRIGATION	081004020	H	BRAZOS	BRAZORIA	020	12	IRR		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	0	0	0	0	0	0
IRRIGATION	081004020	H	BRAZOS	BRAZORIA	020	12	IRR	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	50	50	50	50	50	50
IRRIGATION	081004020	H	BRAZOS-COLORADO	BRAZORIA	020	13	IRR		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	2503	2525	2378	2274	2191	2106
IRRIGATION	081004020	H	BRAZOS-COLORADO	BRAZORIA	020	13	IRR		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	2262	1752	1711	1702	1785	1870
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	0	0	0	0	0	0
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105343	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	720	720	720	720	720	720
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105344	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	1320	1320	1320	1320	1320	1320
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105346	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	2214	2214	2214	2214	2214	2214
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105352	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	3271	3271	3271	3271	3271	3271
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105364	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	734	734	734	734	734	734
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3411104449	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	1200	1200	1200	1200	1200	1200
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR		None	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3411104509	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	2028	2028	2028	2028	2028	2028
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205322B	H	BRAZOS	FORT BEND	12	079	13197	13197	13197	13197	13197	13197
IRRIGATION	081004020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	IRR	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	447	447	447	447	447	447
JONES CREEK	080308000	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	98	91	84	76	72	72
LAKE JACKSON	080338000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	2240	2240	2240	2240	2240	2240
LAKE JACKSON	080338000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	776	776	776	776	776	776
LIVESTOCK	081005020	H	BRAZOS	BRAZORIA	020	12	LIV		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	22	14	10	7	6	4
LIVESTOCK	081005020	H	BRAZOS	BRAZORIA	020	12	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99712020	H	BRAZOS	BRAZORIA	12	020	220	228	232	235	236	238
LIVESTOCK	081005020	H	BRAZOS-COLORADO	BRAZORIA	020	13	LIV		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	204	202	198	194	187	179
LIVESTOCK	081005020	H	BRAZOS-COLORADO	BRAZORIA	020	13	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99713020	H	BRAZOS-COLORADO	BRAZORIA	13	020	200	202	206	210	217	225
LIVESTOCK	081005020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	LIV		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	423	423	421	377	325	278
LIVESTOCK	081005020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99711020	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	545	505	547	591	643	690
MANUFACTURING	081001020	H	BRAZOS	BRAZORIA	020	12	MAN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	288	288	288	287	267	287
MANUFACTURING	081001020	H	BRAZOS	BRAZORIA	020	12	MAN	237200	THE DOW CHEMICAL CO.	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205328B	H	BRAZOS	BRAZORIA	12	020	137475	137475	137475	137475	137475	137475
MANUFACTURING	081001020	H	BRAZOS	BRAZORIA	020	12	MAN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	4796	4493	4026	3597	3116	2600
MANUFACTURING	081001020	H	BRAZOS	BRAZORIA	020	12	MAN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	19329	0	0	0	0	0
MANUFACTURING	081001020	H	BRAZOS	BRAZORIA	020	12	MAN	331	BRAZOS RIVER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	16000	16000	16000	16000	16000	16000
MANUFACTURING	081001020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MAN		None	Surface Water	SAN BERNARD RIVER RUN-OF-RIVER	3461303421	H	BRAZOS-COLORADO	BRAZORIA	13	020	7854	7922	7922	7922	7922	7922
MANUFACTURING	081001020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MAN		None	Surface Water	SAN BERNARD RIVER RUN-OF-RIVER	3461303423	H	BRAZOS-COLORADO	BRAZORIA	13	020	3500	3500	3500	3500	3500	3500
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	202	202	202	202	202	202
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	48	48	48	49	69	49
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105357A	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	13541	13541	13541	13541	13541	13541
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205322B	H	BRAZOS	FORT BEND	12	079	11457	11457	11457	11457	11457	11457
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	11201	11201	11201	11201	11201	11201
MANUFACTURING	081001020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	8811	8811	8811	8811	8811	8811
MANVEL	080721000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	526	409	397	384	376	376
MINING	081003020	H	BRAZOS	BRAZORIA	020	12	MIN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	117	28	28	28	28	28
MINING	081003020	H	BRAZOS	BRAZORIA	020	12	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99912020	H	BRAZOS	BRAZORIA	12	020	190	190	190	190	190	190
MINING	081003020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MIN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	1728	1440	1440	1440	1440	1440
MINING	081003020	H	BRAZOS-COLORADO	BRAZORIA	020	13	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99913020	H	BRAZOS-COLORADO	BRAZORIA	13	020	1124	1124	1124	1124	1124	1124
MINING	081003020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MIN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	640	624	624	624	624	624
MINING	081003020	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99911020	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	305	305	305	305	305	305
ORBIT SYSTEMS INC	084294000	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	47	47	47	47	47	47
ORBIT SYSTEMS INC	084294000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	386	386	386	386	386	386
OYSTER CREEK	080730000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	106	106	106	106	106	106
OYSTER CREEK	080730000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	26	26	26	26	26	26
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205322B	H	BRAZOS	FORT BEND	12	079	9071	9097	9108	9114	9121	9127
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	6041	6058	6066	6070	6074	6078
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	540	541	542	542	543	543
RICHWOOD	080501000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN	2000	BRAZOSPORT WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205366	H	BRAZOS	BRAZORIA	12	020	263	263	263	263	263	263
RICHWOOD	080501000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	22	22	22	22	22	22
SOUTHWEST UTILITIES	084343000	H	SAN JACINTO-BRAZOS	BRAZORIA	020	11	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	SAN JACINTO-BRAZOS	BRAZORIA	11	020	71	71	71	71	71	71
SURFSIDE BEACH	080967000	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	168	168	168	168	168	168
SWEENY	080590000	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	606	606	606	606	606	606
VARNER CREEK UD	084370000	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	359	359	359	359	359	359
WEST COLUMBIA	080640000	H	BRAZOS	BRAZORIA	020	12	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS	BRAZORIA	12	020	481	457	434	413	395	385
WEST COLUMBIA	080640000	H	BRAZOS-COLORADO	BRAZORIA	020	13	MUN		None	Groundwater	GULF COAST AQUIFER	02015	H	BRAZOS-COLORADO	BRAZORIA	13	020	92	88	84	79	76	74
ANAHUAC	080015000	H	NECHES-TRINITY	CHAMBERS	036	07	MUN	150	DISTRICT	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804279B	H	TRINITY	CHAMBERS	08	036	858	858	857	857	856	857
ANAHUAC	080015000	H	TRINITY	CHAMBERS	036	08	MUN	150	DISTRICT	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804279B	H	TRINITY	CHAMBERS	08	036	247	247	248	248	249	248
BAYTOWN	080042000	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	57	57	57	57	57	57
BAYTOWN	080042000	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MUN	15	BAYTOWN AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	821	891	950	996	1040	1084
BEACH CITY	080822000	H	TRINITY	CHAMBERS	036	08	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	7	7	7	7	7	7
BEACH CITY	080822000	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	82	82	82	82	82	82

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year)					
																		2010	2020	2030	2040	2050	2060
COUNTY-OTHER	080757036	H	NECHES-TRINITY	CHAMBERS	036	07	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	NECHES-TRINITY	CHAMBERS	07	036	2	2	2	2	2	2
COUNTY-OTHER	080757036	H	NECHES-TRINITY	CHAMBERS	036	07	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	NECHES-TRINITY	CHAMBERS	07	036	45	43	41	40	39	38
COUNTY-OTHER	080757036	H	TRINITY	CHAMBERS	036	08	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	44	40	37	35	33	32
COUNTY-OTHER	080757036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	49	45	40	35	32	29
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Groundwater	GULF COAST AQUIFER	03615	H	NECHES-TRINITY	CHAMBERS	07	036	3890	3884	3880	3879	3876	3876
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704287	H	NECHES-TRINITY	CHAMBERS	07	036	2528	2528	2528	2528	2528	2528
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704293	H	NECHES-TRINITY	CHAMBERS	07	036	1626	1626	1626	1626	1626	1626
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704304B	H	NECHES-TRINITY	CHAMBERS	07	036	1997	1997	1997	1997	1997	1997
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704290	H	NECHES-TRINITY	CHAMBERS	07	036	1037	1037	1037	1037	1037	1037
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704291	H	NECHES-TRINITY	CHAMBERS	07	036	1078	1078	1078	1078	1078	1078
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704295	H	NECHES-TRINITY	CHAMBERS	07	036	1195	1195	1195	1195	1195	1195
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704299	H	NECHES-TRINITY	CHAMBERS	07	036	1173	1173	1173	1173	1173	1173
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704306	H	NECHES-TRINITY	CHAMBERS	07	036	1818	1818	1818	1818	1818	1818
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410704311	H	NECHES-TRINITY	CHAMBERS	07	036	2072	2072	2072	2072	2072	2072
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704304	H	NECHES-TRINITY	CHAMBERS	07	036	2663	2663	2663	2663	2663	2663
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3410705016	H	NECHES-TRINITY	CHAMBERS	07	036	1012	1012	1012	1012	1012	1012
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704294	H	NECHES-TRINITY	CHAMBERS	07	036	573	573	573	573	573	573
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704300	H	NECHES-TRINITY	CHAMBERS	07	036	805	805	805	805	805	805
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704308	H	NECHES-TRINITY	CHAMBERS	07	036	771	771	771	771	771	771
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704309	H	NECHES-TRINITY	CHAMBERS	07	036	711	711	711	711	711	711
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR		None	Surface Water	NECHES-TRINITY RIVER RUN-OF-RIVER	3460704312	H	NECHES-TRINITY	CHAMBERS	07	036	691	691	691	691	691	691
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR	150	DISTRICT	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804279B	H	TRINITY	CHAMBERS	08	036	40000	40000	40000	40000	40000	40000
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	38000	38000	38000	38000	38000	38000
IRRIGATION	081004036	H	NECHES-TRINITY	CHAMBERS	036	07	IRR	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	16818	16552	16370	16170	15941	15669
IRRIGATION	081004036	H	TRINITY	CHAMBERS	036	08	IRR		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	5688	5464	5330	5207	5089	4988
IRRIGATION	081004036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	IRR		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	530	509	472	439	409	379
IRRIGATION	081004036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	IRR		None	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903918	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	976	976	976	976	976	976
IRRIGATION	081004036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	IRR		None	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903924	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	1209	1209	1209	1209	1209	1209
LIVESTOCK	081005036	H	NECHES-TRINITY	CHAMBERS	036	07	LIV		None	Groundwater	GULF COAST AQUIFER	03615	H	NECHES-TRINITY	CHAMBERS	07	036	16	16	16	16	16	15
LIVESTOCK	081005036	H	NECHES-TRINITY	CHAMBERS	036	07	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99707036	H	NECHES-TRINITY	CHAMBERS	07	036	317	317	317	317	317	318
LIVESTOCK	081005036	H	TRINITY	CHAMBERS	036	08	LIV		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	10	10	10	10	9	9
LIVESTOCK	081005036	H	TRINITY	CHAMBERS	036	08	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99708036	H	TRINITY	CHAMBERS	08	036	50	50	50	50	51	51
LIVESTOCK	081005036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	LIV		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	21	20	18	17	16	15
LIVESTOCK	081005036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99709036	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	48	49	51	52	53	54
MANUFACTURING	081001036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MAN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	3538	3538	3538	3538	3538	3538
MINING	081003036	H	NECHES-TRINITY	CHAMBERS	036	07	MIN		None	Groundwater	GULF COAST AQUIFER	03615	H	NECHES-TRINITY	CHAMBERS	07	036	30	30	30	30	30	30
MINING	081003036	H	NECHES-TRINITY	CHAMBERS	036	07	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99907036	H	NECHES-TRINITY	CHAMBERS	07	036	505	505	505	505	505	505
MINING	081003036	H	TRINITY	CHAMBERS	036	08	MIN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	4907	4907	4907	4907	4907	4907
MINING	081003036	H	TRINITY	CHAMBERS	036	08	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99908036	H	TRINITY	CHAMBERS	08	036	18989	18989	18989	18989	18989	18989
MINING	081003036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MIN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	2561	2561	2561	2511	2440	2341
MINING	081003036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99909036	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	4722	4722	4722	4672	4601	4502
MONT BELVIEU	080413000	H	TRINITY	CHAMBERS	036	08	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	116	116	116	116	116	116
MONT BELVIEU	080413000	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	94	94	94	94	94	94
OLD RIVER-WINFREE	080727000	H	TRINITY	CHAMBERS	036	08	MUN		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY	CHAMBERS	08	036	34	34	35	35	35	35
STEAM ELECTRIC POWER	081002036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	STE		None	Groundwater	GULF COAST AQUIFER	03615	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	1330	1018	1104	1208	1332	1468
STEAM ELECTRIC POWER	081002036	H	TRINITY-SAN JACINTO	CHAMBERS	036	09	STE	398300	NRG	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903926	H	TRINITY-SAN JACINTO	CHAMBERS	09	036	30000	30000	30000	30000	30000	30000
TRINITY BAY CONSERVATION DISTRICT	084362000	H	NECHES-TRINITY	CHAMBERS	036	07	MUN	150	DISTRICT	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804279B	H	TRINITY	CHAMBERS	08	036	2527	2526	2527	2527	2527	2527
TRINITY BAY CONSERVATION DISTRICT	084362000	H	NECHES-TRINITY	CHAMBERS	036	07	MUN	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	421	479	547	623	709	807
TRINITY BAY CONSERVATION DISTRICT	084362000	H	TRINITY	CHAMBERS	036	08	MUN	150	DISTRICT	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804279B	H	TRINITY	CHAMBERS	08	036	1156	1157	1156	1156	1156	1156
TRINITY BAY CONSERVATION DISTRICT	084362000	H	TRINITY	CHAMBERS	036	08	MUN	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	192	219	249	284	324	370
ARCOLA	080998000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	403	304	190	190	190	190
BEASLEY	081012000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	8	8	8	8	8	8
BEASLEY	081012000	H	BRAZOS-COLORADO	FORT BEND	079	13	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	84	84	84	84	84	84
COUNTY-OTHER	080757079	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	2728	771	1942	1942	1942	1942
COUNTY-OTHER	080757079	H	BRAZOS-COLORADO	FORT BEND	079	13	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	221	67	177	235	313	334
COUNTY-OTHER	080757079	H	SAN JACINTO	FORT BEND	079	10	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	114	65	47	47	47	47
COUNTY-OTHER	080757079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	502	324	149	149	149	149
COUNTY-OTHER	080757079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	73	73	73	73	73	73
FAIRCHILDS	081019000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	406	361	260	260	260	260
FIRST COLONY MUD #9	084113000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	1392	998	587	587	587	587
FORT BEND COUNTY MUD #106	084117000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	968	672	384	383	383	383
FORT BEND COUNTY MUD #108	084118000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	587	404	230	228	228	228
FORT BEND COUNTY MUD #111	084119000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	780	540	309	308	308	308
FORT BEND COUNTY MUD #23	084121000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1426	1413	806	806	806	806
FORT BEND COUNTY MUD #25	084122000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1587	1557	1204	1204	1204	1204
FORT BEND COUNTY MUD #67	084126000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	830	575	326	325	325	325
FORT BEND COUNTY MUD #68	084127000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	604	420	240	240	240	240
FORT BEND COUNTY MUD #69	084128000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	479	335	191	191	191	191
FORT BEND COUNTY MUD #81	084129000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	773	723	540	540	540	540
FULSHEAR	080869000	H	BRAZOS	FORT BEND	079	12	MUN			Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	138	122	88	88	88	88
FULSHEAR	080869000	H	BRAZOS	FORT BEND	079	12	MUN			Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	73	65	46	46	46	46
FULSHEAR	080869000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN			Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	138	122	88	88	88	88
HOUSTON	080285000	H	SAN JACINTO	FORT BEND	079	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	4068	4667	5386	6136	7166	7864
HOUSTON	080285000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	2857	2294	1513	1513	1513	1513
HOUSTON	080285000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	983	2269	2797	3520	4010
IRRIGATION	081004079	H	BRAZOS	FORT BEND	079	12	IRR		None	Groundwater	BRAZOS RIVER ALLUVIUM AQUIFER	07905	H	BRAZOS	FORT BEND	12	079	5907	5907	5907	5907	5907	5907
IRRIGATION	081004079	H	BRAZOS	FORT BEND	079	12	IRR	398300	NRG	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205320	H	BRAZOS	FORT BEND	12	079	12000	12000	12000	12000	12000	12000
IRRIGATION	081004079	H	BRAZOS-COLORADO	FORT BEND	079	13	IRR		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	18869	18869	18869	18869	18869	18869
IRRIGATION	081004079	H	SAN JACINTO	FORT BEND	079	10	IRR		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	7538	7538	7538	7538	7538	7538
IRRIGATION	081004079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	IRR		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	6998	6998	6998	6998	6998	6998
IRRIGATION	081004079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	IRR	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	2143	2143	2143	2143	2143	2143
KATY	080312000	H	SAN JACINTO	FORT BEND	079	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	201	112	97	97	97	97
KENDLETON	KENDLETON	H	BRAZOS-COLORADO	FORT BEND	079	13	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	151	151	151	151	151	151
LIVESTOCK	081005079	H	BRAZOS	FORT BEND	079	12	LIV		None	Groundwater	BRAZOS RIVER ALLUVIUM AQUIFER	07905	H	BRAZOS	FORT BEND	12	079	691	484	276	276	276	276
LIVESTOCK	081005079	H	BRAZOS	FORT BEND	079	12	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99712079	H	BRAZOS	FORT BEND	12	079	0	207	415	415	415	415
LIVESTOCK	081005079	H	BRAZOS-COLORADO	FORT BEND	079	13	LIV		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	211	211	211	211	211	211
LIVESTOCK	081005079	H	SAN JACINTO	FORT BEND	079	10	LIV		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	57	40	23	23	23	23
LIVESTOCK	081005079	H	SAN JACINTO	FORT BEND	079	10	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99710079	H	SAN JACINTO	FORT BEND	10	079	13	30	47	47	47	47
LIVESTOCK	081005079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	LIV		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	135	101	60	60	60	60
LIVESTOCK	081005079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99711079	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	64	98	139	139	139	139
MANUFACTURING	081001079	H	BRAZOS	FORT BEND	079	12	MAN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	1235	907	538	538	538	538
MANUFACTURING	081001079	H	BRAZOS	FORT BEND	079	12	MAN	331	BRAZOS RIVER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	400	400	400	400	400	400
MANUFACTURING	081001079	H	SAN JACINTO	FORT BEND	079	10	MAN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	1979	1453	862	862	862	855
MANUFACTURING	081001079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MAN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	3649	2679	1588	1588	1588	1588
MANUFACTURING	081001079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MAN	380	FORT BEND CO. WCID 1	Surface Water	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105170	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1000	1000	1000	1000	1000	1000
MEADOWS	080792000	H	SAN JACINTO	FORT BEND	079	10	MUN	821000	FORT BEND COUNTY WCID #2	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	1887	1301	735	727	724	724
MEADOWS	080792000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	821000	FORT BEND COUNTY WCID #2	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	188	130	73	72	72	72
MINING	081003079	H	BRAZOS	FORT BEND	079	12	MIN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	618	441	255	255	255	255
MINING	081003079	H	BRAZOS-COLORADO	FORT BEND	079	13	MIN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	140	140	140	140	140	140
MINING	081003079	H	SAN JACINTO	FORT BEND	079	10	MIN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	272	200	116	116	116	116
MINING	081003079	H	SAN JACINTO	FORT BEND	079	10	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99910079	H	SAN JACINTO	FORT BEND	10	079	8	8	8	8	8	8
MINING	081003079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MIN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1455	1408	814	822	830	838
MINING	081003079	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MIN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	517	517	517	517	517	517
MISSOURI CITY	080409000	H	BRAZOS	FORT BEND	079	12	MUN	999903	MISSOURI CITY	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	315	273	187	187	187	187
MISSOURI CITY	080409000	H	BRAZOS	FORT BEND	079	12	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	24	24	24	24	24	24
MISSOURI CITY	080409000	H	BRAZOS	FORT BEND	079	12	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	186	187	187	188	188	189
MISSOURI CITY	080409000	H	SAN JACINTO	FORT BEND	079	10	MUN	999903	MISSOURI CITY	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	2577	2237	1527	1527	1527	1527
MISSOURI CITY	080409000	H	SAN JACINTO	FORT BEND	079	10	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	31	31	31	31	31	31
MISSOURI CITY	080409000	H	SAN JACINTO	FORT BEND	079	10	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	1528	1533	1537	1540	1537	1548

Region H

Table 3H.1: Current Water Supplies Available to Region H by City and Category

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year) 2010	2020	2030	2040	2050	2060
MISSOURI CITY	080409000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999903	MISSOURI CITY	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	11664	10125	6912	6912	6912	6912
MISSOURI CITY	080409000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	32	32	32	32	32	32
MISSOURI CITY	080409000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	6912	6940	6957	6970	6960	7005
NEEDVILLE	080428000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	207	207	207	207	207	207
NEEDVILLE	080428000	H	BRAZOS-COLORADO	FORT BEND	079	13	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS-COLORADO	FORT BEND	13	079	250	250	250	250	250	250
NFBWA	NFBWA	H	BRAZOS	FORT BEND	079	12	MUN	999901	NFBWA	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	1295	1295	1220	1220	1220	1220
NFBWA	NFBWA	H	BRAZOS	FORT BEND	079	12	MUN	999901	NFBWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	785	888	1015	1271	1577
NFBWA	NFBWA	H	SAN JACINTO	FORT BEND	079	10	MUN	999901	NFBWA	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	18990	17740	12151	12151	12151	12151
NFBWA	NFBWA	H	SAN JACINTO	FORT BEND	079	10	MUN	999901	NFBWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	9,636	8,841	8,201	7,427	6,675
NFBWA	NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999901	NFBWA	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	12739	12739	12739	12739	12739	12739
NFBWA	NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999901	NFBWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	10,418	11,252	11,825	12,382	12,866
ORBIT SYSTEMS INC	084294000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	15	11	7	7	7	7
PECAN GROVE MUD #1	084299000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	2301	1625	936	936	936	936
PECAN GROVE MUD #1	084299000	H	BRAZOS	FORT BEND	079	12	MUN	331	BRAZOS RIVER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	2450	2450	2450	2450	2450	2450
PECAN GROVE MUD #1	084299000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	612	432	249	249	249	249
PECAN GROVE MUD #1	084299000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	331	BRAZOS RIVER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	651	651	651	651	651	651
PLANTATION MUD	084303000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	573	388	218	214	212	212
PLEAK	081053000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	547	547	547	547	547	547
RICHMOND	080500000	H	BRAZOS	FORT BEND	079	12	MUN	999905	RICHMOND-ROSENBERG	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	2252	1627	1106	1106	1106	1106
RICHMOND	080500000	H	BRAZOS	FORT BEND	079	12	MUN	999905	RICHMOND-ROSENBERG	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	3000	3000	3000	3000	3000	3000
ROSENBERG	080518000	H	BRAZOS	FORT BEND	079	12	MUN	999905	RICHMOND-ROSENBERG	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	5156	4484	3173	3173	3173	3173
ROSENBERG	080518000	H	BRAZOS	FORT BEND	079	12	MUN	999905	RICHMOND-ROSENBERG	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	4500	4500	4500	4500	4500	4500
SIENNA PLANTATION MUD #2	084334000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1061	848	485	482	482	482
SIMONTON	081062000	H	BRAZOS	FORT BEND	079	12	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	419	419	419	419	419	419
STAFFORD	080577000	H	SAN JACINTO	FORT BEND	079	10	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	333	304	221	221	221	221
STAFFORD	080577000	H	SAN JACINTO	FORT BEND	079	10	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	1155	1177	1180	1183	1185	1187
STAFFORD	080577000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	1395	1274	927	927	927	927
STAFFORD	080577000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	4838	4939	4953	4963	4969	4975
STEAM ELECTRIC POWER	081002079	H	BRAZOS	FORT BEND	079	12	STE	398300	NRG	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	8500	8500	8500	8500	8500	8500
STEAM ELECTRIC POWER	081002079	H	BRAZOS	FORT BEND	079	12	STE	398300	NRG	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205325	H	BRAZOS	FORT BEND	12	079	28711	28711	28711	28711	28711	28711
STEAM ELECTRIC POWER	081002079	H	BRAZOS	FORT BEND	079	12	STE		None	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	11316	11316	11316	11316	11316	11316
STEAM ELECTRIC POWER	081002079	H	BRAZOS	FORT BEND	079	12	STE	398300	NRG	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	74500	74500	74500	74500	74500	74500
SUGAR LAND	080585000	H	BRAZOS	FORT BEND	079	12	MUN	999906	SUGAR LAND	Groundwater	GULF COAST AQUIFER	07915	H	BRAZOS	FORT BEND	12	079	8223	6901	4044	4025	4025	4025
SUGAR LAND	080585000	H	BRAZOS	FORT BEND	079	12	MUN	999906	SUGAR LAND	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	5082	5082	5082	5082	5082	5082
SUGAR LAND	080585000	H	SAN JACINTO	FORT BEND	079	10	MUN	999906	SUGAR LAND	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	824	691	405	403	403	403
SUGAR LAND	080585000	H	SAN JACINTO	FORT BEND	079	10	MUN	999906	SUGAR LAND	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	509	509	509	509	509	509
SUGAR LAND	080585000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999906	SUGAR LAND	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO-BRAZOS	FORT BEND	11	079	11234	9428	5525	5499	5499	4599
SUGAR LAND	080585000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999906	SUGAR LAND	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	6942	6942	6942	6942	6942	6942
SUGAR LAND	080585000	H	SAN JACINTO-BRAZOS	FORT BEND	079	11	MUN	999906	SUGAR LAND	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	30	30	30	30	30	30
WHCRWA	088002000	H	SAN JACINTO	FORT BEND	079	10	MUN	999907	WHCRWA	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	3208	2640	1740	1740	1740	1740
WHCRWA	088002000	H	SAN JACINTO	FORT BEND	079	10	MUN	999907	WHCRWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1,238	941	924	1,080	1,266	1,447
BACLIFF MUD	084012000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	1373	1373	1373	1373	1373	1373
BAYOU VISTA	080759000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	43	43	43	43	43	43
BAYOU VISTA	080759000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	519	519	519	519	519	519
BOLIVAR PENINSULAR SUD	084027000	H	NECHES-TRINITY	GALVESTON	084	07	MUN	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	5549	5499	5449	5399	5349	5299
CLEAR LAKE SHORES	080764000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	28	28	28	28	28	28
CLEAR LAKE SHORES	080764000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	155	155	155	155	155	155
COUNTY-OTHER	080757084	H	NECHES-TRINITY	GALVESTON	084	07	MUN	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	1	1	1	1	1	1
COUNTY-OTHER	080757084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	110	95	85	80	76	75
COUNTY-OTHER	080757084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	275	275	275	275	275	275
COUNTY-OTHER	080757084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	18477	18477	18477	18477	18477	18477
DICKINSON	080165000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316325	GALVESTON COUNTY WCID #1	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	309	309	309	309	309	309
DICKINSON	080165000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316325	GALVESTON COUNTY WCID #1	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	2091	2091	2091	2091	2091	2091
FRIENDSWOOD	080219000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	325	325	325	325	325	325
FRIENDSWOOD	080219000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	5099	5231	5299	5325	5343	5356
GALVESTON	080227000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316200	CITY OF GALVESTON	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	1610	1590	1571	1552	1539	1539
GALVESTON	080227000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316200	CITY OF GALVESTON	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	24217	24217	24217	24217	24217	24217
GALVESTON COUNTY MUD #1	084135000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	43	43	43	43	43	43
GALVESTON COUNTY MUD #1	084135000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316200	CITY OF GALVESTON	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	529	604	648	667	682	691
GALVESTON COUNTY WCID #12	084136000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	27	27	27	27	27	27
GALVESTON COUNTY WCID #12	084136000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	799	799	799	799	799	799
HITCHCOCK	080279000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	93	93	93	91	91	92
HITCHCOCK	080279000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	1731	1731	1731	1731	1731	1731
IRRIGATION	081004084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	IRR		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	1020	1020	1020	1020	1020	1020
IRRIGATION	081004084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	IRR	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	142	142	142	142	142	142
JAMAICA BEACH	080886000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	30	30	30	30	30	30
JAMAICA BEACH	080886000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316200	CITY OF GALVESTON	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	372	430	463	480	491	498
KEMAH	080316000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	28	28	28	28	28	28
KEMAH	080316000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	64	64	64	64	64	64
LA MARQUE	080342000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	216	212	207	202	199	199
LA MARQUE	080342000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	3207	3207	3207	3207	3207	3207
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	748	748	748	748	748	748
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	13	13	13	13	13	13
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	2287	2287	2287	2287	2287	2287
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316325	GALVESTON COUNTY WCID #1	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	1120	1120	1120	1120	1120	1120
LIVESTOCK	081005084	H	NECHES-TRINITY	GALVESTON	084	07	LIV		None	Groundwater	GULF COAST AQUIFER	08415	H	NECHES-TRINITY	GALVESTON	07	084	2	2	2	2	2	2
LIVESTOCK	081005084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	LIV		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	3	3	3	3	3	3
LIVESTOCK	081005084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99711084	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	306	296	280	280	280	281
MANUFACTURING	081001084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MAN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	4101	4101	4101	4101	4101	4101
MANUFACTURING	081001084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	20000	20000	20000	20000	20000	20000
MANUFACTURING	081001084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	10204	10204	10204	10204	10204	10204
MANUFACTURING	081001084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MAN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	120E0	G	BRAZOS	RESERVOIR	12	000	38210	38210	38210	38210	38210	38210
MINING	081003084	H	NECHES-TRINITY	GALVESTON	084	07	MIN		None	Groundwater	GULF COAST AQUIFER	08415	H	NECHES-TRINITY	GALVESTON	07	084	14	14	14	14	14	14
MINING	081003084	H	NECHES-TRINITY	GALVESTON	084	07	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99907084	H	NECHES-TRINITY	GALVESTON	07	084	106	106	106	106	106	106
MINING	081003084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MIN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	13	13	13	13	13	13
MINING	081003084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99911084	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	101	101	101	101	101	101
SAN LEON MUD	084329000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	63	63	63	63	63	63
SAN LEON MUD	084329000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	2059	2059	2059	2059	2059	2059
SANTA FE	080743000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	99	99	98	96	95	96
SANTA FE	080743000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	1154	1154	1154	1154	1154	1154
STEAM ELECTRIC POWER	081002084	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	STE	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	2231	2231	2231	2231	2231	2231
TEXAS CITY	080602000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	648	638	627	614	605	606
TEXAS CITY	080602000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	12016	12016	12016	12016	12016	12016
TEXAS CITY	080602000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	316325	GALVESTON COUNTY WCID #1	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	21	21	21	21	21	21
TIKI ISLAND	080973000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN		None	Groundwater	GULF COAST AQUIFER	08415	H	SAN JACINTO-BRAZOS	GALVESTON	11	084	24	24	24	24	24	24
TIKI ISLAND	080973000	H	SAN JACINTO-BRAZOS	GALVESTON	084	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	415	415	415	415	415	415
BAYTOWN	080042000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	62	62	62	62	62	62
BAYTOWN	080042000	H	SAN JACINTO	HARRIS	101	10	MUN	15	BAYTOWN AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	845	842	838	836	834	831
BAYTOWN	080042000	H	TRINITY-SAN JACINTO	HARRIS	101	09	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	1053	1053	1053	1053	1053	1053
BAYTOWN	080042000	H	TRINITY-SAN JACINTO	HARRIS	101	09	MUN	15	BAYTOWN AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	14268	14201	14146	14102	14060	14019
BELLAIRE	080046000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	747	747	747	747	747	747
BELLAIRE	080046000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1310	1310	1310	1310	1310	1310
BLUE BELL MANOR UTILITY COMPANY	084026000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	400	169	111	109	108	108
BRITMOORE UTILITIES	084036000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	330	165	125	125	125	125
BUNKER HILL VILLAGE	080085000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	301	298	296	293	292	292
BUNKER HILL VILLAGE	080085000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	635	635	635	635	635	635
CANDLELIGHT HILLS SUBDIVISION	084043000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	***316***	***159***	***122***	***122***	***122***	***122***
CHCRWA	CHCRWA	H	SAN JACINTO	HARRIS	101	10	MUN	999902	CHCRWA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	3246	1930	1287	1287	1287	1287
CHCRWA	CHCRWA	H	SAN JACINTO	HARRIS	101	10	MUN	999902	CHCRWA	Surface Water	HOUSTON LAKE/RESERVOIR	10030	H	SAN JACINTO	RESERVOIR	10	000	2375	2375	2375	2375	2375	2375

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year)					
																		2010	2020	2030	2040	2050	2060
CHIMNEY HILL MUD	084053000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	468	194	125	124	122	122
CHIMNEY HILL MUD	084053000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	426	426	426	426	426	426
CLEAR BROOK CITY MUD WOODMEADOWS	084063000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	200	200	200	200	200	200
CLEAR BROOK CITY MUD WOODMEADOWS	084063000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1680	1680	1680	1680	1680	1680
CONSUMERS WATER INC	084072000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	279	157	131	131	131	131
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	**2968**	**2968**	**2968**	**2968**	**2968**	**2968**
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	4221	1791	2967	2967	2967	2967
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	281	281	281	281	281	281
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	195	195	195	195	195	195
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1957	1957	1957	1957	1957	1957
COUNTY-OTHER	080757101	H	SAN JACINTO	HARRIS	101	10	MUN	1095	LA PORTE AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	344	344	344	344	344	344
COUNTY-OTHER	080757101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	524	409	502	406	393	402
COUNTY-OTHER	080757101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	147	147	147	147	147	147
COUNTY-OTHER	080757101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	1095	LA PORTE AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	**344**	**344**	**344**	**344**	**344**	**344**
COUNTY-OTHER	080757101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1403	1403	1403	1403	1403	1403
COUNTY-OTHER	080757101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	**475**	**355**	**399**	**399**	**399**	**399**
COUNTY-OTHER	080757101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MUN	15	BAYTOWN AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	816	816	816	816	816	816
COUNTY-OTHER	080757101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	2016	2016	2016	2016	2016	2016
CROSBY MUD	084078000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	179	179	179	179	179	179
CROSBY MUD	084078001	H	SAN JACINTO	HARRIS	102	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	1050	1050	1050	1050	1050	1050
CRYSTAL SPRNGS WATER COMPANY	084081000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	15	8	7	7	7	7
DEER PARK	080154000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	172	172	172	172	172	172
DEER PARK	080154000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1569	1562	1585	1586	1587	1590
DEER PARK	080154000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	264	264	264	264	264	264
DEER PARK	080154000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	2387	2394	2371	2370	2369	2366
EL DORADO UD	084101000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	326	152	109	109	109	109
EL LAGO	080695000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	53	52	51	51	51	51
EL LAGO	080695000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	203	173	151	133	119	108
FOUNTAINVIEW SUBDIVISION	084132000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	239	117	88	88	88	88
FRIENDSWOOD	080219000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	206	201	196	196	196	196
FRIENDSWOOD	080219000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1620	1488	1420	1394	1376	1363
GALENA PARK	080226000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	123	123	123	123	123	123
GALENA PARK	080226000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	**1008**	**1008**	**1008**	**1008**	**1008**	**1008**
GREEN TRAILS MUD	084143000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	642	311	232	232	232	232
HARRIS COUNTY FWSD #47	084149000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**85**	**82**	**79**	**76**	**74**	**74**
HARRIS COUNTY FWSD #47	084149000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	288	288	288	288	288	288
HARRIS COUNTY FWSD #51	084150000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**507**	**495**	**490**	**490**	**490**	**490**
HARRIS COUNTY FWSD #51	084150000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1539	1539	1539	1539	1539	1539
HARRIS COUNTY FWSD #6	084151000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	35	35	35	35	35	35
HARRIS COUNTY FWSD #6	084151000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	187	187	187	187	187	187
HARRIS COUNTY MUD #11	084153000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	292	141	105	105	105	105
HARRIS COUNTY MUD #119 INWOOD NORTH	084154000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	615	276	180	176	174	174
HARRIS COUNTY MUD #132	084157000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1229	653	516	516	516	516
HARRIS COUNTY MUD #151	084159000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	893	380	252	250	250	250
HARRIS COUNTY MUD #152	084160000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	551	304	246	246	246	246
HARRIS COUNTY MUD #153	084161000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	859	501	421	421	421	421
HARRIS COUNTY MUD #154	084162000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**473**	**249**	**195**	**195**	**195**	**195**
HARRIS COUNTY MUD #158	084165000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	340	179	118	115	115	115
HARRIS COUNTY MUD #158	084165000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	411	411	411	411	411	411
HARRIS COUNTY MUD #180	084170000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	431	222	173	173	173	173
HARRIS COUNTY MUD #189	084174000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	563	**291**	**227**	**227**	**227**	**227**
HARRIS COUNTY MUD #261	084179000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	609	260	173	173	173	173
HARRIS COUNTY MUD #261	084179000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	73	64	65	65	65	65
HARRIS COUNTY MUD #345	084182000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	990	421	281	279	279	279
HARRIS COUNTY MUD #46	084183000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	585	247	162	160	160	160
HARRIS COUNTY MUD #5	084184000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	459	193	126	123	121	121
HARRIS COUNTY MUD #50	084185000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	434	197	139	139	139	139
HARRIS COUNTY MUD #50	084185000	H	SAN JACINTO	HARRIS	101	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	**560**	**560**	**560**	**560**	**560**	**560**
HARRIS COUNTY MUD #53	084186000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	387	387	387	387	387	387
HARRIS COUNTY MUD #53	084186000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	836	836	836	836	836	836
HARRIS COUNTY MUD #55	084187000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**1051**	**439**	**285**	**285**	**285**	**285**
HARRIS COUNTY MUD #55	084187000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	3877	3877	3877	3877	3877	3877
HARRIS COUNTY MUD #8	084189000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	139	139	139	139	139	139
HARRIS COUNTY MUD #8	084189000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	420	420	420	420	420	420
HARRIS COUNTY UD #14	084190000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	407	191	137	137	137	137
HARRIS COUNTY UD #15	084191000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	299	145	108	108	108	108
HARRIS COUNTY WCID #1	084193000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	781	379	283	283	283	283
HARRIS COUNTY WCID #1	084193000	H	SAN JACINTO	HARRIS	101	10	MUN	15	BAYTOWN AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	**784**	**784**	**784**	**784**	**784**	**784**
HARRIS COUNTY WCID #133	084195000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	528	225	149	147	149	149
HARRIS COUNTY WCID #21	084196000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**142**	**142**	**142**	**142**	**142**	**142**
HARRIS COUNTY WCID #21	084196000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	913	913	913	913	913	913
HARRIS COUNTY WCID #36	084197000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	269	263	269	269	269	269
HARRIS COUNTY WCID #36	084197001	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	802	802	802	802	802	802
HARRIS COUNTY WCID #50	084198000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**61**	**61**	**61**	**61**	**61**	**61**
HARRIS COUNTY WCID #76	084199000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	207	87	57	56	55	55
HARRIS COUNTY WCID #84	084200000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	60	60	60	60	60	60
HARRIS COUNTY WCID #84	084200000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	310	310	310	310	310	310
HEDWIG VILLAGE	080269000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**166**	**165**	**163**	**162**	**161**	**161**
HEDWIG VILLAGE	080269000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	161	154	147	139	132	126
HILLSHIRE VILLAGE	081025000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	134	56	37	37	36	36
HILLSHIRE VILLAGE	081025000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	117	117	117	117	117	117
HOUSTON	080285000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	72361	72361	72361	72361	72361	72361
HOUSTON	080285000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	289443	319037	348522	384130	421828	428215
HOUSTON	080285000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	**2016**	**2016**	**2016**	**2016**	**2016**	**2016**
HOUSTON	080285000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	10071	11926	13719	15703	17804	18160
HOUSTON	080285000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	8076	8076	8076	8076	8076	8076
HUMBLE	080289000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	2565	1219	892	892	892	892
HUMBLE	080289000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	47	47	47	47	47	47
HUNTERS CREEK VILLAGE	080290000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	349	349	349	349	349	349
HUNTERS CREEK VILLAGE	080290000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	339	348	356	364	372	379
IRRIGATION	081004101	H	SAN JACINTO	HARRIS	101	10	IRR		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	9883	9883	9883	9883	9883	9883
IRRIGATION	081004101	H	SAN JACINTO	HARRIS	101	10	IRR	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	1476	1476	1476	1476	1476	1476
IRRIGATION	081004101	H	TRINITY-SAN JACINTO	HARRIS	101	09	IRR		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	5417	5417	5417	5417	5417	5417
IRRIGATION	081004101	H	TRINITY-SAN JACINTO	HARRIS	101	09	IRR		None	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903922	H	TRINITY-SAN JACINTO	HARRIS	09	101	661	661	661	661	661	661
IRRIGATION	081004101	H	TRINITY-SAN JACINTO	HARRIS	101	09	IRR		None	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903923	H	TRINITY-SAN JACINTO	HARRIS	09	101	694	694	694	694	694	694
JACINTO CITY	080301000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	260	260	260	260	260	260
JACINTO CITY	080301000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	**1120**	**1120**	**1120**	**1120**	**1120**	**1120**
JERSEY VILLAGE	080709000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1110	564	434	434	434	434
JERSEY VILLAGE	080709000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	840	840	840	840	840	840
KATY	080312000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	2238	1160	909	909	909	909
LA PORTE	080346000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	29	29	29	29	29	29
LA PORTE	080346001	H	SAN JACINTO	HARRIS	101	10	MUN	1095	LA PORTE AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	466	470	466	479	481	483
LA PORTE	080346000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	504	504	504	504	504	504
LA PORTE	080346000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	1095	LA PORTE AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	8190	8186	8190	8177	8175	8173
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	2	2	2	2	2	2
LEAGUE CITY	080350000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205171	H	BRAZOS	FORT BEND	12	079	7	7	7	7	7	7
LIVESTOCK	081005101	H	SAN JACINTO	HARRIS	101	10	LIV		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	666	285	190	190	190	190
LIVESTOCK	081005101	H	SAN JACINTO	HARRIS	101	10	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99710101	H	SAN JACINTO	HARRIS	10	101	324	666	803	803	803	803
LIVESTOCK	081005101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	LIV		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	**9**	**9**	**9**	**9**	**9**	**9**

Region H
Table 3H.1: Current Water Supplies Available to Region H by City and Category

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year)					
																		2010	2020	2030	2040	2050	2060
LIVESTOCK	081005101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99711101	H	SAN JACINTO-BRAZOS	HARRIS	11	101	82	82	82	82	82	82
LIVESTOCK	081005101	H	TRINITY-SAN JACINTO	HARRIS	101	09	LIV		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	18	18	18	18	18	18
LIVESTOCK	081005101	H	TRINITY-SAN JACINTO	HARRIS	101	09	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99709101	H	TRINITY-SAN JACINTO	HARRIS	09	101	73	73	73	73	73	73
LONGHORN TOWN UD	084235000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	417	257	222	222	222	222
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	51293	51293	51293	51293	51293	51293
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1046	1046	1046	1046	1046	1046
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	70	70	70	70	70	70
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	SAN JACINTO RIVER RUN-OF-RIVER	3461004964	H	SAN JACINTO	HARRIS	10	101	31503	31503	31503	31503	31503	31503
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	TRINITY RIVER RUN-OF-RIVER	3410805271B	H	TRINITY	LIBERTY	08	146	31223	31223	31223	31223	31223	31223
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	396200	CITY OF HOUSTON	Surface Water	HOUSTON LAKE/RESERVOIR	10030	H	SAN JACINTO	RESERVOIR	10	000	54650	54650	54650	54650	54650	54650
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	3896	3896	3924	3933	3938	3936
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	54	54	54	54	54	54
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	396200	CITY OF HOUSTON	Surface Water	HOUSTON LAKE/RESERVOIR	10030	H	SAN JACINTO	RESERVOIR	10	000	34849	34849	34849	34849	34849	34849
MANUFACTURING	081001101	H	SAN JACINTO	HARRIS	101	10	MAN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	207642	207642	207642	207642	207642	207642
MANUFACTURING	081001101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MAN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	6692	6692	6692	6692	6692	6692
MANUFACTURING	081001101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MAN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1144	1144	1116	1107	1102	1104
MANUFACTURING	081001101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MAN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	52803	52803	52803	52803	52803	52803
MANUFACTURING	081001101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MAN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1792	1792	1792	1792	1792	1792
MANUFACTURING	081001101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MAN		None	Groundwater	GULF COAST AQUIFER	10115	H	TRINITY-SAN JACINTO	HARRIS	09	101	7261	7261	7261	7261	7261	7261
MANUFACTURING	081001101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MAN	240	SAN JACINTO RIVER AUTHORITY	Surface Water	CONROE LAKE/RESERVOIR	10060	H	SAN JACINTO	MONTGOMERY	10	170	12977	12977	12977	12977	12977	12977
MANUFACTURING	081001101	H	TRINITY-SAN JACINTO	HARRIS	101	09	MAN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	29368	29368	29368	29368	29368	29368
MASON CREEK UD	084247000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1646	696	458	454	452	452
MINING	081003101	H	SAN JACINTO	HARRIS	101	10	MIN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	126	126	126	126	126	126
MINING	081003101	H	SAN JACINTO	HARRIS	101	10	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99910101	H	SAN JACINTO	HARRIS	10	101	992	992	992	992	992	992
MINING	081003101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MIN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	2	2	2	2	2	2
MINING	081003101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MIN		None	Surface Water	OTHER LOCAL SUPPLY	99911101	H	SAN JACINTO-BRAZOS	HARRIS	11	101	19	19	19	19	19	19
MISSOURI CITY	080409000	H	SAN JACINTO	HARRIS	101	10	MUN	999903	MISSOURI CITY	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	1306	1078	714	714	714	714
MISSOURI CITY	080409000	H	SAN JACINTO	HARRIS	101	10	MUN	999903	MISSOURI CITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	959	916	891	871	886	816
NASSAU BAY	080424000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	103	101	100	100	100	100
NASSAU BAY	080424000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	2184	2184	2184	2184	2184	2184
NFBWA	NFBWA	H	SAN JACINTO	HARRIS	101	10	MUN	999901	NFBWA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1636	470	311	311	311	311
NFBWA	NFBWA	H	SAN JACINTO	HARRIS	101	10	MUN	999901	NFBWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	595	453	393	354	316
NHCRWA	088000000	H	SAN JACINTO	HARRIS	101	10	MUN	999904	NHCRWA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	81243	41071	30558	30558	30558	30558
NHCRWA	088000000	H	SAN JACINTO	HARRIS	101	10	MUN	999904	NHCRWA	Surface Water	HOUSTON LAKE/RESERVOIR	10030	H	SAN JACINTO	RESERVOIR	10	000	34714	34714	34714	34714	34714	34714
NORTH BELT UD	084275000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	322	180	146	146	146	146
NORTH GREEN MUD	084279000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	244	114	81	87	93	101
NORTHWEST HARRIS COUNTY MUD #23	084286000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	411	218	175	175	175	175
NORTHWEST PARK MUD	084287000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	2063	1027	685	672	665	665
PARKWAY UD	084298000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	61	59	58	56	55	55
PASADENA	080456000	H	SAN JACINTO	HARRIS	101	10	MUN	651900	CITY OF PASADENA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1599	1599	1599	1599	1599	1599
PASADENA	080456000	H	SAN JACINTO	HARRIS	101	10	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	22654	22654	22654	22654	22654	22654
PASADENA	080456000	H	SAN JACINTO	HARRIS	101	10	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	***7483***	***7482***	***7483***	***7483***	***7483***	***7483***
PASADENA	080456000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	651900	CITY OF PASADENA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	448	448	448	448	448	448
PASADENA	080456000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	6340	6340	6340	6340	6340	6340
PASADENA	080456000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1136	1137	1136	1136	1136	1136
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	89	103	116	116	116	116
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205322B	H	BRAZOS	FORT BEND	12	079	338	312	301	295	288	282
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	225	208	200	196	192	188
PEARLAND	080457000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	20	19	18	18	17	17
PINE TRAILS UTILITY	084302000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	188	188	188	188	188	188
PINE TRAILS UTILITY	084302000	H	SAN JACINTO	HARRIS	101	10	MUN	607473	NORTH CHANNEL WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	480	480	480	480	480	480
PINEY POINT VILLAGE	080468000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	255	255	255	255	255	255
PINEY POINT VILLAGE	080468000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	247	245	244	244	243	242
ROLLING FORK PUD	084411000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	494	219	151	151	151	151
SEABROOK	080545000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	242	242	242	242	242	242
SEABROOK	080545000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	651900	CITY OF PASADENA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	917	947	969	987	1001	1012
SHOREACRES	080558000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	20	20	20	20	20	20
SHOREACRES	080558000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	1095	LA PORTE AREA WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	406	406	406	406	406	406
SOUTH HOUSTON	080569000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	458	458	458	458	458	458
SOUTH HOUSTON	080569000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	4199	4199	4199	4199	4199	4199
SOUTHSIDE PLACE	080572000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	***81***	***81***	***81***	***81***	***81***	***81***
SOUTHSIDE PLACE	080572000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	319	319	319	319	319	319
SOUTHWEST UTILITIES	084343000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	497	239	176	176	176	176
SPRING VALLEY	080575000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	622	275	189	189	189	189
STAFFORD	080577000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	07915	H	SAN JACINTO	FORT BEND	10	079	10	7	9	8	7	7
STAFFORD	080577000	H	SAN JACINTO	HARRIS	101	10	MUN	325	GULF COAST WATER AUTHORITY	Surface Water	BRAZOS RIVER RUN-OF-RIVER	3461205168	H	BRAZOS	FORT BEND	12	079	201	78	61	48	40	32
STEAM ELECTRIC POWER	081002101	H	SAN JACINTO	HARRIS	101	10	STE	396200	CITY OF HOUSTON	Surface Water	HOUSTON LAKE/RESERVOIR	10030	H	SAN JACINTO	RESERVOIR	10	000	14369	14369	14369	14369	14369	14369
STEAM ELECTRIC POWER	081002101	H	SAN JACINTO-BRAZOS	HARRIS	101	11	STE		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	44	44	44	44	44	44
SUNBELT FWSD	084350000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	3142	1568	1184	1184	1184	1184
SUNBELT FWSD	084350000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	187	187	187	187	187	187
SUNBELT FWSD	084350000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	299	299	299	299	299	299
TAYLOR LAKE VILLAGE	080751000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	91	89	87	85	85	85
TAYLOR LAKE VILLAGE	080751000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	***1730***	***1730***	***1730***	***1730***	***1730***	***1730***
TOMBALL	080608000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	1835	990	768	768	768	768
TRAIL OF THE LAKES MUD	084355000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	989	413	273	268	268	268
WALLER	080629000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	83	46	38	38	38	38
WALLER	080629000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	29	29	29	29	29	29
WEBSTER	080635000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO-BRAZOS	HARRIS	11	101	242	242	242	242	242	242
WEBSTER	080635000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	396200	CITY OF HOUSTON	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	***4535***	4535	4535	4535	4535	4535
WEBSTER	080635000	H	SAN JACINTO-BRAZOS	HARRIS	101	11	MUN	159000	CLEAR LAKE CITY WATER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	4475	4475	4475	4475	4475	4475
WEST HARRIS COUNTY MUD #6	084387000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	396	168	112	110	108	108
WEST UNIVERSITY PL.	080643000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	620	620	620	620	620	620
WEST UNIVERSITY PL.	080643000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	2,053	2,053	2,053	2,053	2,053	2,053
WHCRWA	088002000	H	SAN JACINTO	HARRIS	101	10	MUN	999907	WHCRWA	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	42047	20324	14781	14781	14781	14781
WHCRWA	088002000	H	SAN JACINTO	HARRIS	101	10	MUN	999907	WHCRWA	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	19199	19496	19513	19357	19170	18990
WILLOW RUN SUBDIVISION	084398000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	466	196	128	126	124	124
WINDFERN FOREST UD	084401000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	563	310	203	201	201	201
WINDFERN FOREST UD	084401000	H	SAN JACINTO	HARRIS	101	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	67	70	70	70	70	70
WOODCREEK MUD	084404000	H	SAN JACINTO	HARRIS	101	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	435	245	200	200	200	200
BUFFALO	080083000	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	348	348	348	348	348	348
CENTERVILLE	080105000	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	189	189	189	189	189	189
COUNTY-OTHER	080757145	H	BRAZOS	LEON	145	12	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	BRAZOS	LEON	12	145	195	195	195	195	195	195
COUNTY-OTHER	080757145	H	BRAZOS	LEON	145	12	MUN		None	Groundwater	QUEEN CITY AQUIFER	14524	H	BRAZOS	LEON	12	145	200	200	200	200	200	200
COUNTY-OTHER	080757145	H	TRINITY	LEON	145	08	MUN		None	Groundwater	SPARTA AQUIFER	14527	H	TRINITY	LEON	08	145	143	143	143	143	143	143
COUNTY-OTHER	080757145	H	TRINITY	LEON	145	08	MUN		None	Groundwater	QUEEN CITY AQUIFER	14524	H	TRINITY	LEON	08	145	143	143	143	143	143	143
COUNTY-OTHER	080757145	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	142	142	142	142	142	142
FLO COMMUNITY WSC	084114000	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	418	418	418	418	418	418

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year) 2010	2020	2030	2040	2050	2060
IRRIGATION	081004145	H	TRINITY	LEON	145	08	IRR		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	261	261	261	261	261	261
IRRIGATION	081004145	H	TRINITY	LEON	145	08	IRR		None	Groundwater	SPARTA AQUIFER	14527	H	TRINITY	LEON	08	145	281	281	281	281	281	281
JEWETT	080887000	H	BRAZOS	LEON	145	12	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	51	51	51	51	51	51
JEWETT	080887000	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	151	151	151	151	151	151
LIVESTOCK	081005145	H	BRAZOS	LEON	145	12	LIV		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	BRAZOS	LEON	12	145	200	200	200	200	200	200
LIVESTOCK	081005145	H	BRAZOS	LEON	145	12	LIV		None	Groundwater	SPARTA AQUIFER	14527	H	BRAZOS	LEON	12	145	223	223	223	223	223	223
LIVESTOCK	081005145	H	TRINITY	LEON	145	08	LIV		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	484	484	484	484	484	484
LIVESTOCK	081005145	H	TRINITY	LEON	145	08	LIV		None	Groundwater	SPARTA AQUIFER	14527	H	TRINITY	LEON	08	145	784	784	784	784	784	784
MANUFACTURING	081001145	H	TRINITY	LEON	145	08	MAN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	714	714	714	714	714	714
MINING	081003145	H	BRAZOS	LEON	145	12	MIN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	BRAZOS	LEON	12	145	221	213	209	205	201	198
MINING	081003145	H	TRINITY	LEON	145	08	MIN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	1,296	1,251	1,226	1,204	1,183	1,166
NORMANGEE	080927000	H	BRAZOS	LEON	145	12	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	42	42	42	42	42	42
NORMANGEE	080927000	H	TRINITY	LEON	145	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	14510	H	TRINITY	LEON	08	145	106	106	106	106	106	106
AMES	080676000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	137	137	137	137	137	137
CLEVELAND	080116000	H	SAN JACINTO	LIBERTY	146	10	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	1,341	1,341	1,341	1,341	1,341	1,341
COUNTY-OTHER	080757146	H	NECHES	LIBERTY	146	06	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	154	154	154	154	154	154
COUNTY-OTHER	080757146	H	NECHES-TRINITY	LIBERTY	146	07	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES-TRINITY	LIBERTY	07	146	11	11	11	11	11	11
COUNTY-OTHER	080757146	H	SAN JACINTO	LIBERTY	146	10	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	1294	1294	1294	1294	1294	1294
COUNTY-OTHER	080757146	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	2,787	2,787	2,787	2,787	2,787	2,787
COUNTY-OTHER	080757146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY-SAN JACINTO	LIBERTY	09	146	187	187	187	187	187	187
DAISETTA	080149000	H	NECHES	LIBERTY	146	06	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	58	58	58	58	58	58
DAISETTA	080149000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	91	91	91	91	91	91
DAYTON	080152000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	1737	1737	1737	1737	1737	1737
HARDIN	080878000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	136	136	136	136	136	136
HARDIN WSC	084148000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	567	567	567	567	567	567
IRRIGATION	081004146	H	NECHES	LIBERTY	146	06	IRR		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	12	12	12	12	12	12
IRRIGATION	081004146	H	NECHES	LIBERTY	146	06	IRR	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	2500	2500	2500	2500	2500	2500
IRRIGATION	081004146	H	NECHES-TRINITY	LIBERTY	146	07	IRR		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES-TRINITY	LIBERTY	07	146	375	374	372	369	368	367
IRRIGATION	081004146	H	NECHES-TRINITY	LIBERTY	146	07	IRR		None	Surface Water	TRINITY RIVER RUN-OF-RIVER	3410805271A	H	TRINITY	LIBERTY	08	146	392	377	367	356	344	330
IRRIGATION	081004146	H	NECHES-TRINITY	LIBERTY	146	07	IRR	140	LOWER NECHES VALLEY AUTHORITY	Surface Water	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	060A0	I	NECHES	RESERVOIR	06	000	17,200	17,200	17,200	17,200	17,200	17,200
IRRIGATION	081004146	H	NECHES-TRINITY	LIBERTY	146	07	IRR	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1,677	1,651	1,632	1,614	1,590	1,563
IRRIGATION	081004146	H	SAN JACINTO	LIBERTY	146	10	IRR		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	830	830	830	830	830	830
IRRIGATION	081004146	H	TRINITY	LIBERTY	146	08	IRR		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	10,367	8,078	6,416	4,597	2,447	0
IRRIGATION	081004146	H	TRINITY	LIBERTY	146	08	IRR	396200	CITY OF HOUSTON	Surface Water	TRINITY RIVER RUN-OF-RIVER	3460804277	H	TRINITY	LIBERTY	08	146	33,000	33,000	33,000	33,000	33,000	33,000
IRRIGATION	081004146	H	TRINITY	LIBERTY	146	08	IRR		None	Surface Water	TRINITY RIVER RUN-OF-RIVER	3410805271A	H	TRINITY	LIBERTY	08	146	2108	2123	2133	2144	2156	2170
IRRIGATION	081004146	H	TRINITY	LIBERTY	146	08	IRR	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	9005	9297	9498	9716	9969	10268
IRRIGATION	081004146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	IRR		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY-SAN JACINTO	LIBERTY	09	146	5683	5643	5608	5573	5535	5507
IRRIGATION	081004146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	IRR		None	Surface Water	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	3460903909	H	TRINITY-SAN JACINTO	LIBERTY	09	146	685	685	685	685	685	685
KENEFICK	081033000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	94	94	94	94	94	94
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	LIBERTY	146	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	72	71	72	73	77	80
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	108	108	108	108	108	108
LIBERTY	080356000	H	TRINITY	LIBERTY	146	08	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	1,509	1,509	1,509	1,509	1,509	1,509
LIVESTOCK	081005146	H	NECHES	LIBERTY	146	06	LIV		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	59	59	59	59	59	34
LIVESTOCK	081005146	H	NECHES	LIBERTY	146	06	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99706146	H	NECHES	LIBERTY	06	146	45	45	45	45	45	70
LIVESTOCK	081005146	H	NECHES-TRINITY	LIBERTY	146	07	LIV		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES-TRINITY	LIBERTY	07	146	35	35	35	35	35	35
LIVESTOCK	081005146	H	SAN JACINTO	LIBERTY	146	10	LIV		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	140	140	140	140	140	140
LIVESTOCK	081005146	H	TRINITY	LIBERTY	146	08	LIV		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	446	446	446	446	446	446
LIVESTOCK	081005146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	LIV		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY-SAN JACINTO	LIBERTY	09	146	32	32	32	32	32	15
LIVESTOCK	081005146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99709146	H	TRINITY-SAN JACINTO	LIBERTY	09	146	0	0	0	0	0	17
MANUFACTURING	081001146	H	SAN JACINTO	LIBERTY	146	10	MAN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	331	331	331	331	331	331
MANUFACTURING	081001146	H	TRINITY	LIBERTY	146	08	MAN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	62	62	62	62	62	62
MERCY WSC	084253000	H	SAN JACINTO	LIBERTY	146	10	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	75	75	75	75	75	75
MINING	081003146	H	NECHES	LIBERTY	146	06	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	32	32	32	32	32	32
MINING	081003146	H	NECHES-TRINITY	LIBERTY	146	07	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES-TRINITY	LIBERTY	07	146	23	23	23	23	23	22
MINING	081003146	H	SAN JACINTO	LIBERTY	146	10	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	34	34	34	34	34	34
MINING	081003146	H	TRINITY	LIBERTY	146	08	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	4070	4026	3982	3940	3893	3841
MINING	081003146	H	TRINITY	LIBERTY	146	08	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	854	854	854	854	854	854
MINING	081003146	H	TRINITY-SAN JACINTO	LIBERTY	146	09	MIN		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY-SAN JACINTO	LIBERTY	09	146	3,717	3,717	3,717	3,717	3,717	3,717
PLUM GROVE	081054000	H	SAN JACINTO	LIBERTY	146	10	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	141	141	141	141	141	141
SOUTHWEST UTILITIES	084343000	H	SAN JACINTO	LIBERTY	146	10	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	SAN JACINTO	LIBERTY	10	146	14	14	14	14	14	14
STEAM ELECTRIC POWER	081002146	H	TRINITY	LIBERTY	146	08	STE		None	Groundwater	GULF COAST AQUIFER	14615	H	TRINITY	LIBERTY	08	146	2,962	2,962	2,962	2,962	2,962	2,962
WEST HARDIN WSC	084383000	H	NECHES	LIBERTY	146	06	MUN		None	Groundwater	GULF COAST AQUIFER	14615	H	NECHES	LIBERTY	06	146	29	29	29	29	29	29
COUNTY-OTHER	080757157	H	BRAZOS	MADISON	157	12	MUN		None	Groundwater	SPARTA AQUIFER	15727	H	BRAZOS	MADISON	12	157	106	106	106	106	106	106
COUNTY-OTHER	080757157	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	347	350	350	350	350	319
COUNTY-OTHER	080757157	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	QUEEN CITY AQUIFER	15724	H	TRINITY	MADISON	08	157	95	96	96	96	96	96
COUNTY-OTHER	080757157	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	SPARTA AQUIFER	15727	H	TRINITY	MADISON	08	157	123	90	73	123	123	123
COUNTY-OTHER	080757157	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	UNDIFFERENTIATED AQUIFER	15722	H	TRINITY	MADISON	08	157	332	334	334	333	329	329
IRRIGATION	081004157	H	TRINITY	MADISON	157	08	IRR		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	***19***	***19***	***19***	***19***	***19***	***19***
LIVESTOCK	081005157	H	BRAZOS	MADISON	157	12	LIV		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	BRAZOS	MADISON	12	157	120	120	120	120	120	120
LIVESTOCK	081005157	H	TRINITY	MADISON	157	08	LIV		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	630	630	630	630	630	630
MADISONVILLE	080382000	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	SPARTA AQUIFER	15727	H	TRINITY	MADISON	08	157	781	781	781	781	781	781
MANUFACTURING	081001157	H	TRINITY	MADISON	157	08	MAN		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	260	260	260	260	260	260
MINING	081003157	H	BRAZOS	MADISON	157	12	MIN		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	BRAZOS	MADISON	12	157	9	9	9	9	9	9
MINING	081003157	H	TRINITY	MADISON	157	08	MIN		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	15	15	15	15	15	15
NORMANGEE	080927000	H	TRINITY	MADISON	157	08	MUN		None	Groundwater	CARRIZO-WILCOX AQUIFER	15710	H	TRINITY	MADISON	08	157	9	9	9	9	9	9
CONROE	080130000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	8,678	8,407	8,658	8,645	8,623	8,598
CONROE	080130000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	93	4,149	3,754	3,487
CONSUMERS WATER INC	084072000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	171	140	144	145	151	153
COUNTY-OTHER	080757170	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	17,652	15,647	17,615	17,587	17,543	17,492
COUNTY-OTHER	080757170	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	1,030	3,291	5,009
CRYSTAL SPRNGS WATER COMPANY	084081000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	467	405	438	465	464	462
CUT AND SHOOT	080854000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	162	136	134	136	138	139
CUT AND SHOOT	080854000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	1	63	56	52
EAST PLANTATION UD	084098000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	363	317	345	361	361	359
EAST PLANTATION UD	084098000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	4	173	163	155
H M W SUD	084147000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,306	1,074	1,071	1,083	1,099	1,107
H M W SUD	084147000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	11	499	447	409
HOUSTON	080285000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	396200	CITY OF HOUSTON	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	178	178	178	178	178	178
IRRIGATION	081004170	H	SAN JACINTO	MONTGOMERY	170	10	IRR	240	SAN JACINTO RIVER AUTHORITY	Surface Water	CONROE LAKE/RESERVOIR	10060	H	SAN JACINTO	MONTGOMERY	10	170	880	880	880	880	880	880
IRRIGATION	081004170	H	SAN JACINTO	MONTGOMERY	170	10	IRR		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	51	38	31	26	21	18
LIVESTOCK	081005170	H	SAN JACINTO	MONTGOMERY	170	10	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99710170	H	SAN JACINTO	MONTGOMERY	10	170	510	510	510	510	510	510
LIVESTOCK	081005170	H	SAN JACINTO	MONTGOMERY	170	10	LIV		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	393	293	239	199	161	132
MAGNOLIA	080907000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	338	338	337	337	336	335
MANUFACTURING	081001170	H	SAN JACINTO	MONTGOMERY	170	10	MAN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,576	1,344	1,224	1,127	997	888
MINING	081003170	H	SAN JACINTO	MONTGOMERY	170	10	MIN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	370	293	247	212	177	148
MONTGOMERY	MONTGOMERY	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	192	192	191	191	191	190
MONTGOMERY	MONTGOMERY	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	0	320	287
MONTGOMERY COUNTY MUD #18	084261000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,441	1,370	1,438	1,436	1,432	1,428
MONTGOMERY COUNTY MUD #18	084261000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	882	869	852
MONTGOMERY COUNTY MUD #19	084262000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	354	260	210	173	141	115
MONTGOMERY COUNTY MUD #19	084262000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	2	81	58	44
MONTGOMERY COUNTY MUD #8	084263000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	649	631	622	546	441	358
MONTGOMERY COUNTY MUD #8	084263000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	159	113	84
MONTGOMERY COUNTY MUD #9	084264000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	614	613	612	589	488	404
MONTGOMERY COUNTY MUD #9	084264000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	172	126	95
MONTGOMERY COUNTY UD #2	084265000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	431	318	256	210	171	139
MONTGOMERY COUNTY UD #3	084266000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	374	290	263	245	232	222
MONTGOMERY COUNTY UD #3	084266000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	114	95	83
MONTGOMERY COUNTY UD #4	084267000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	756	559	449	369	300	245

Table 3H.1: Current Water Supplies Available to Region H by City and Category

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year)					
																		2010	2020	2030	2040	2050	2060
MONTGOMERY COUNTY UD #4	084267000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	171	124	92
MONTGOMERY COUNTY WCID #1	084268000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	385	299	271	254	241	232
NEW CANEY MUD	084272000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,125	948	1,012	1,060	1,118	1,115
OAK RIDGE NORTH	080726000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	527	431	421	418	414	414
OAK RIDGE NORTH	080726000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	5	193	169	154
PANORAMA VILLAGE	080732000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	504	393	333	290	247	211
PANORAMA VILLAGE	080732000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	4	135	102	80
PATTON VILLAGE	080734000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	67	51	48	45	44	43
POINT AQUARIUS MUD	084305000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	566	523	564	564	562	560
PORTER WSC	084307000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,498	1,242	1,266	1,309	1,060	868
RAYFORD ROAD MUD	084312000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,779	1,317	1,063	884	719	587
RAYFORD ROAD MUD	084312000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	11	409	295	221
RIVER PLANTATION MUD	084322000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	644	475	380	312	253	206
ROMAN FOREST	080801000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	419	418	418	417	416	415
SHENANDOAH	080745000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,345	1,166	1,107	1,064	1,025	996
SHENANDOAH	080745000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	12	493	419	370
SOUTHERN MONTGOMERY COUNTY MUD	084339000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	1,465	1,384	1,134	974	804	673
SOUTHERN MONTGOMERY COUNTY MUD	084339000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	12	450	328	251
SOUTHWEST UTILITIES	084343000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	196	162	165	169	174	178
SPLENDORA	080962000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	145	129	140	144	144	144
SPRING CREEK UD	084344000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	414	352	376	401	411	410
SPRING CREEK UD	084344000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	4	186	174	166
STAGECOACH	STAGECOACH	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	61	61	61	61	61	60
STANLEY LAKE MUD	084347000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	574	521	421	348	284	231
STANLEY LAKE MUD	084347000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	0	162	116	87
STEAM ELECTRIC POWER	081002170	H	SAN JACINTO	MONTGOMERY	170	10	STE	240	SAN JACINTO RIVER AUTHORITY	Surface Water	CONROE LAKE/RESERVOIR	10060	H	SAN JACINTO	MONTGOMERY	10	170	7,841	7,841	7,841	7,841	7,841	7,841
STEAM ELECTRIC POWER	081002170	H	SAN JACINTO	MONTGOMERY	170	10	STE		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	3,888	3,885	3,879	3,873	3,864	3,852
THE WOODLANDS	088001000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	11,303	11,294	11,279	11,041	8,974	7,359
THE WOODLANDS	088001000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	275	5,093	3,652	2,729
WILLIS	080655000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	438	374	383	401	415	429
WILLIS	080655000	H	SAN JACINTO	MONTGOMERY	170	10	MUN	240	SAN JACINTO RIVER AUTHORITY	Reuse	SJRA INDIRECT REUSE	3510170	H	SAN JACINTO	MONTGOMERY	10	170	0	0	4	185	169	159
WOODBRANCH	080807000	H	SAN JACINTO	MONTGOMERY	170	10	MUN		None	Groundwater	GULF COAST AQUIFER	17015	H	SAN JACINTO	MONTGOMERY	10	170	141	117	106	97	91	87
COUNTY-OTHER	080757187	H	TRINITY	POLK	187	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	20	20	20	20	20	20
COUNTY-OTHER	080757187	H	TRINITY	POLK	187	08	MUN		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	1,600	1,600	1,600	1,600	1,600	1,600
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	POLK	187	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	591	577	569	568	571	577
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	POLK	187	08	MUN		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	890	890	890	890	890	890
LIVESTOCK	081005187	H	TRINITY	POLK	187	08	LIV		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	134	134	134	134	134	134
LIVINGSTON	080362000	H	TRINITY	POLK	187	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	5,601	5,601	5,601	5,601	5,601	5,601
MINING	081003187	H	TRINITY	POLK	187	08	MIN		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	29	29	29	29	29	29
ONALASKA	080933000	H	TRINITY	POLK	187	08	MUN		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	189	189	189	189	189	189
ONALASKA WSC	084293000	H	TRINITY	POLK	187	08	MUN		None	Groundwater	GULF COAST AQUIFER	18715	H	TRINITY	POLK	08	187	240	240	240	240	240	240
TRINITY RURAL WSC	084363000	H	TRINITY	POLK	187	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	24	27	31	32	38	39
COLDSPRING	080122000	H	SAN JACINTO	SAN JACINTO	204	10	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	44	44	44	44	44	44
COLDSPRING	080122000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	163	163	163	163	163	163
COUNTY-OTHER	080757204	H	SAN JACINTO	SAN JACINTO	204	10	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	868	868	868	868	868	868
COUNTY-OTHER	080757204	H	TRINITY	SAN JACINTO	204	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	560	560	560	560	560	560
COUNTY-OTHER	080757204	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	1339	1339	1339	1339	1339	1240
IRRIGATION	081004204	H	TRINITY	SAN JACINTO	204	08	IRR	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	135	135	135	135	135	135
IRRIGATION	081004204	H	TRINITY	SAN JACINTO	204	08	IRR		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	532	532	532	532	532	532
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	SAN JACINTO	SAN JACINTO	204	10	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	63	70	73	75	75	74
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	SAN JACINTO	SAN JACINTO	204	10	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	95	95	95	95	95	95
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	SAN JACINTO	204	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	137	150	159	163	162	158
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	206	206	206	206	206	206
LIVESTOCK	081005204	H	SAN JACINTO	SAN JACINTO	204	10	LIV		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	142	142	142	142	142	142
LIVESTOCK	081005204	H	TRINITY	SAN JACINTO	204	08	LIV		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	142	142	142	142	142	142
MANUFACTURING	081001204	H	SAN JACINTO	SAN JACINTO	204	10	MAN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	48	48	48	48	48	48
MERCY WSC	084253000	H	SAN JACINTO	SAN JACINTO	204	10	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	338	338	338	338	338	338
MINING	081003204	H	SAN JACINTO	SAN JACINTO	204	10	MIN		None	Groundwater	GULF COAST AQUIFER	20415	H	SAN JACINTO	SAN JACINTO	10	204	23	23	22	21	20	20
MINING	081003204	H	TRINITY	SAN JACINTO	204	08	MIN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	7	6	6	6	6	6
POINT BLANK	081056000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	85	85	85	85	85	85
RIVERSIDE WSC	084323000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	150	150	150	150	150	150
RIVERSIDE WSC	084323000	H	TRINITY	SAN JACINTO	204	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	0	0	5	10	10	10
SAN JACINTO WSC	084328000	H	TRINITY	SAN JACINTO	204	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	280	280	280	280	280	280
SAN JACINTO WSC	084328000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	406	406	406	406	406	406
SHEPHERD	080746000	H	TRINITY	SAN JACINTO	204	08	MUN		None	Groundwater	GULF COAST AQUIFER	20415	H	TRINITY	SAN JACINTO	08	204	301	301	301	301	301	301
COUNTY-OTHER	080757228	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	2737	2723	2721	2729	2739	2748
COUNTY-OTHER	080757228	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1190	1190	1190	1190	1190	1190
COUNTY-OTHER	080757228	H	TRINITY	TRINITY	228	08	MUN		None	Groundwater	GULF COAST AQUIFER	22815	H	TRINITY	TRINITY	08	228	526	526	526	526	522	502
GROVETON	080255000	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	119	126	127	123	118	113
IRRIGATION	081004228	H	TRINITY	TRINITY	228	08	IRR	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	290	290	290	290	290	290
IRRIGATION	081004228	H	TRINITY	TRINITY	228	08	IRR		None	Groundwater	GULF COAST AQUIFER	22815	H	TRINITY	TRINITY	08	228	467	467	467	467	467	467
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	72	68	64	59	54	50
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	TRINITY	228	08	MUN		None	Groundwater	GULF COAST AQUIFER	22815	H	TRINITY	TRINITY	08	228	109	109	109	104	98	95
LIVESTOCK	081005228	H	TRINITY	TRINITY	228	08	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99708228	H	TRINITY	TRINITY	08	228	211	211	211	211	211	211
MINING	081003228	H	TRINITY	TRINITY	228	08	MIN		None	Groundwater	GULF COAST AQUIFER	22815	H	TRINITY	TRINITY	08	228	6	6	6	6	6	6
TRINITY	080610000	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	370	370	370	370	370	370
TRINITY	080610000	H	TRINITY	TRINITY	228	08	MUN		None	Groundwater	UNDIFFERENTIATED AQUIFER	22822	H	TRINITY	TRINITY	08	228	170	170	165	152	142	137
TRINITY RURAL WSC	084363000	H	TRINITY	TRINITY	228	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1127	1121	1118	1116	1106	1102
CONSOLIDATED WSC	084071000	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	YEGUA-JACKSON AQUIFER	23631	H	TRINITY	WALKER	08	236	8	8	8	8	8	8
COUNTY-OTHER	080757236	H	SAN JACINTO	WALKER	236	10	MUN	410000	CITY OF HUNTSVILLE	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1737	1341	1376	1422	1497	1585
COUNTY-OTHER	080757236	H	SAN JACINTO	WALKER	236	10	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	3640	1516	1808	1538	1642	1696
COUNTY-OTHER	080757236	H	SAN JACINTO	WALKER	236	10	MUN		None	Groundwater	YEGUA-JACKSON AQUIFER	23631	H	SAN JACINTO	WALKER	10	236	91	91	91	91	91	91
COUNTY-OTHER	080757236	H	TRINITY	WALKER	236	08	MUN	410000	CITY OF HUNTSVILLE	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	1263	1659	1624	1578	1503	1415
COUNTY-OTHER	080757236	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	1398	1671	1826	1266	1003	652
COUNTY-OTHER	080757236	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	UNDIFFERENTIATED AQUIFER	23622	H	TRINITY	WALKER	08	236	200	200	200	200	200	200
COUNTY-OTHER	080757236	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	YEGUA-JACKSON AQUIFER	23631	H	TRINITY	WALKER	08	236	610	554	546	546	546	546
HUNTSVILLE	080292000	H	SAN JACINTO	WALKER	236	10	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	15869	15870	15868	15869	15870	15869
HUNTSVILLE	080292000	H	SAN JACINTO	WALKER	236	10	MUN	410000	CITY OF HUNTSVILLE	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	4597	4597	4597	4597	4597	4597
HUNTSVILLE	080292000	H	TRINITY	WALKER	236	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	3534	3533	3535	3534	3533	3534
HUNTSVILLE	080292000	H	TRINITY	WALKER	236	08	MUN	410000	CITY OF HUNTSVILLE	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	686	667	640	608	586	567
IRRIGATION	081004236	H	SAN JACINTO	WALKER	236	10	IRR		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	5	5	5	5	5	5
IRRIGATION	081004236	H	TRINITY	WALKER	236	08	IRR		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	6	6	6	6	6	6
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	WALKER	236	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	19	18	17	16	15	15
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	084226000	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	29	29	29	29	28	28
LIVESTOCK	081005236	H	SAN JACINTO	WALKER	236	10	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99710236	H	SAN JACINTO	WALKER	10	236	0	1	12	8	9	11
LIVESTOCK	081005236	H	SAN JACINTO	WALKER	236	10	LIV		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	310	309	298	302	301	299
LIVESTOCK	081005236	H	TRINITY	WALKER	236	08	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99708236	H	TRINITY	WALKER	08	236	106	127	138	143	148	154
LIVESTOCK	081005236	H	TRINITY	WALKER	236	08	LIV		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	216	195	184	179	174	168
MANUFACTURING	081001236	H	SAN JACINTO	WALKER	236	10	MAN		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	577	577	577	577	577	577
MANUFACTURING	081001236	H	TRINITY	WALKER	236	08	MAN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	2631	2422	2111	2312	2352	2369
MINING	081003236	H	SAN JACINTO	WALKER	236	10	MIN		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	7	7	7	7	7	7
MINING	081003236	H	TRINITY	WALKER	236	08	MIN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	6	6	6	6	6	6
NEW WAVERLY	080926000	H	SAN JACINTO	WALKER	236	10	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	SAN JACINTO	WALKER	10	236	218	218	218	218	218	218
RIVERSIDE WSC	084323000	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	310	305	310	310	310	310
RIVERSIDE WSC	084323000	H	TRINITY	WALKER	236	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	20	20	15	10	10	10
TRINITY RURAL WSC	084363000	H	TRINITY	WALKER	236	08	MUN	187	TRINITY RIVER AUTHORITY	Surface Water	LIVINGSTON-WALLISVILLE SYSTEM	084H0	H	TRINITY	RESERVOIR	08	000	89	92	92	92	96	99
WALKER COUNTY RURAL WSC	084372000	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	GULF COAST AQUIFER	23615	H	TRINITY	WALKER	08	236	563	544	524	496	477	462
WALKER COUNTY RURAL WSC	084372000	H	TRINITY	WALKER	236	08	MUN		None	Groundwater	SPARTA AQUIFER	23627	H	TRINITY	WALKER	08	236	276	276	276	276	276	276
BROOKSHIRE	080077000	H	BRAZOS	WALLER	237	12	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	673	673	673	673	673	673

Region H
Table 3H.1: Current Water Supplies Available to Region H by City and Category

WUG NAME	WUG ID	WUG RWPG	WUG Basin	WUG County	WUG County ID	WUG Basin ID	USE Type	WWP Number	WWP Name	SOURCE Type	SOURCE Name	SOURCE ID	SOURCE RWPG	SOURCE Basin	SOURCE County	SOURCE Basin ID	SOURCE County ID	Supply (acre-feet per year) 2010	2020	2030	2040	2050	2060
COUNTY-OTHER	080757237	H	BRAZOS	WALLER	237	12	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	685	685	685	685	685	685
COUNTY-OTHER	080757237	H	SAN JACINTO	WALLER	237	10	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	841	841	841	841	841	841
HEMPSTEAD	080271000	H	BRAZOS	WALLER	237	12	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	1,457	1,457	1,457	1,457	1,457	1,457
IRRIGATION	081004237	H	BRAZOS	WALLER	237	12	IRR		None	Groundwater	BRAZOS RIVER ALLUVIUM AQUIFER	23705	H	BRAZOS	WALLER	12	237	4825	4825	4825	4825	4825	4825
IRRIGATION	081004237	H	SAN JACINTO	WALLER	237	10	IRR		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	7700	7226	7701	8100	6824	5218
IRRIGATION	081004237	H	SAN JACINTO	WALLER	237	10	IRR		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	10,453	10,453	10,452	10,040	9,737	9,537
KATY	080312000	H	SAN JACINTO	WALLER	237	10	MUN		None	Groundwater	GULF COAST AQUIFER	10115	H	SAN JACINTO	HARRIS	10	101	189	121	110	110	110	110
LIVESTOCK	081005237	H	BRAZOS	WALLER	237	12	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99712237	H	BRAZOS	WALLER	12	237	232	232	232	232	242	277
LIVESTOCK	081005237	H	BRAZOS	WALLER	237	12	LIV		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	444	444	444	444	434	399
LIVESTOCK	081005237	H	SAN JACINTO	WALLER	237	10	LIV		None	Surface Water	LIVESTOCK LOCAL SUPPLY	99710237	H	SAN JACINTO	WALLER	10	237	90	90	90	90	102	107
LIVESTOCK	081005237	H	SAN JACINTO	WALLER	237	10	LIV		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	173	173	173	173	161	156
MANUFACTURING	081001237	H	BRAZOS	WALLER	237	12	MAN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	17	17	17	17	17	17
MANUFACTURING	081001237	H	SAN JACINTO	WALLER	237	10	MAN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	72	72	72	72	72	72
MINING	081003237	H	BRAZOS	WALLER	237	12	MIN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	9	9	9	9	9	9
MINING	081003237	H	SAN JACINTO	WALLER	237	10	MIN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	71	71	71	71	71	71
PINE ISLAND	080938000	H	BRAZOS	WALLER	237	12	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	117	117	117	117	117	117
PRAIRIE VIEW	080485000	H	BRAZOS	WALLER	237	12	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	BRAZOS	WALLER	12	237	1129	1129	1129	1129	1129	1129
PRAIRIE VIEW	080485000	H	SAN JACINTO	WALLER	237	10	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	124	124	124	124	124	124
WALLER	080629000	H	SAN JACINTO	WALLER	237	10	MUN		None	Groundwater	GULF COAST AQUIFER	23715	H	SAN JACINTO	WALLER	10	237	416	416	416	416	416	416

Appendix 3I

Current Water Supplies Available to Region H by Wholesale Water Provider

This Page Intentionally
Left Blank

Table 3I: Current Water Supplies Available to WUGs in Region H by W olesale Water Provider

WWP Name[1]	WWP Number	Source RWPG	Source WWP[2]	WWP Number	Source ID	Source Name	Supply (acre-feet per year) 2010	2020	2030	2040	2050	2060
BAYTOWN AREA WATER AUTHORITY	15	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	17,534	17,534	17,534	17,534	17,534	17,534
BRAZOS RIVER AUTHORITY	331	G	SELF SUPPLIED	331	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	19,501	19,501	19,501	19,501	19,501	19,501
BRAZOSPORT WATER AUTHORITY	2000	H	SELF SUPPLIED	2000	3461205366	BRAZOS RIVER RUN-OF-RIVER	8,742	8,742	8,742	8,742	8,742	8,742
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	H	SELF SUPPLIED	150	3460804279B	TRINITY RIVER RUN-OF-RIVER	44,788	44,788	44,788	44,788	44,788	44,788
CHCRWA	999902	H	CITY OF HOUSTON	396200	10030	HOUSTON LAKE/RESERVOIR	2,375	2,375	2,375	2,375	2,375	2,375
		H	SELF SUPPLIED	999902	10115	GULF COAST AQUIFER	3,246	1,930	1,287	1,287	1,287	1,287
CITY OF GALVESTON	316200	H	GULF COAST WATER AUTHORITY	325	3461205168	BRAZOS RIVER RUN-OF-RIVER	901	1,034	1,111	1,147	1,173	1,189
					3461205171	BRAZOS RIVER RUN-OF-RIVER	24,217	24,217	24,217	24,217	24,217	24,217
		H	SELF SUPPLIED	316200	08415	GULF COAST AQUIFER	1,610	1,590	1,571	1,552	1,539	1,539
CITY OF HOUSTON	396200	H	SELF SUPPLIED	396200	07915	GULF COAST AQUIFER	2,857	2,294	1,513	1,513	1,513	1,513
					084H0	LIVINGSTON-WALLISVILLE SYSTEM	644,906	677,937	711,220	750,090	791,642	799,573
					10030	HOUSTON LAKE/RESERVOIR	103,868	103,868	103,868	103,868	103,868	103,868
					10115	GULF COAST AQUIFER	83,386	80,950	82,127	82,127	82,127	82,127
					17015	GULF COAST AQUIFER	178	178	178	178	178	178
					3460804277	TRINITY RIVER RUN-OF-RIVER	33,000	33,000	33,000	33,000	33,000	33,000
CITY OF HUNTSVILLE	410000	H	TRINITY RIVER AUTHORITY	187	084H0	LIVINGSTON-WALLISVILLE SYSTEM	22,403	22,403	22,403	22,403	22,403	22,403
		H	SELF SUPPLIED	410000	23615	GULF COAST AQUIFER	5,283	5,264	5,237	5,205	5,183	5,164
CITY OF PASADENA	651900	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	38,514	38,514	38,514	38,514	38,514	38,514
		H	SELF SUPPLIED	651900	10115	GULF COAST AQUIFER	2,047	2,047	2,047	2,047	2,047	2,047
CLEAR LAKE CITY WATER AUTHORITY	159000	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	26,876	26,876	26,876	26,876	26,876	26,876
FORT BEND CO. WCID 1	380	H	FORT BEND CO. WCID 1	380	3461105170	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	1,000	1,000	1,000	1,000	1,000	1,000
FORT BEND COUNTY WCID #2	821000	H	SELF SUPPLIED	821000	07915	GULF COAST AQUIFER	2,075	1,431	808	799	796	796
			GULF COAST WATER AUTHORITY	325	3461205168	BRAZOS RIVER RUN-OF-RIVER	6,384	6,384	6,384	6,384	6,384	6,384
					3461205171	BRAZOS RIVER RUN-OF-RIVER	195	195	195	195	195	195
GALVESTON COUNTY WCID #1	316325	H	GULF COAST WATER AUTHORITY	325	3461205168	BRAZOS RIVER RUN-OF-RIVER	2,091	2,091	2,091	2,091	2,091	2,091
					3461205171	BRAZOS RIVER RUN-OF-RIVER	1,141	1,141	1,141	1,141	1,141	1,141
		H	SELF SUPPLIED	316325	08415	GULF COAST AQUIFER	309	309	309	309	309	309
GULF COAST WATER AUTHORITY	325	H	GULF COAST WATER AUTHORITY	325	3461105357A	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	13,541	13,541	13,541	13,541	13,541	13,541
					3461205168	BRAZOS RIVER RUN-OF-RIVER	58,773	58,773	58,773	58,773	58,773	58,773
					3461205171	BRAZOS RIVER RUN-OF-RIVER	35,530	35,530	35,530	35,530	35,530	35,530
					3461205322B	BRAZOS RIVER RUN-OF-RIVER	34,063	34,063	34,063	34,063	34,063	34,063
		G	BRAZOS RIVER AUTHORITY	331	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	38,260	38,260	38,260	38,260	38,260	38,260
LA PORTE AREA WATER AUTHORITY	1095	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	9,750	9,750	9,750	9,750	9,750	9,750
LOWER NECHES VALLEY AUTHORITY	140	I	SELF SUPPLIED	140	060A0	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	63,863	63,898	63,946	64,007	64,083	64,177
MISSOURI CITY	999903	H	GULF COAST WATER AUTHORITY	325	3461205168	BRAZOS RIVER RUN-OF-RIVER	9,672	9,663	9,659	9,656	9,658	9,645
		H	SELF SUPPLIED	999903	07915	GULF COAST AQUIFER	15,862	13,713	9,340	9,340	9,340	9,340
NFBWA	999901	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	0	21,434	21,434	21,434	21,434	21,434
		H	SELF SUPPLIED	999901	07915	GULF COAST AQUIFER	33,373	32,083	26,332	26,332	26,332	26,332
			SELF SUPPLIED		10115	GULF COAST AQUIFER	1,636	470	311	311	311	311
NHCRWA	999904	H	CITY OF HOUSTON	396200	10030	HOUSTON LAKE/RESERVOIR	34,714	34,714	34,714	34,714	34,714	34,714
		H	SELF SUPPLIED	999904	10115	GULF COAST AQUIFER	81,243	41,071	30,558	30,558	30,558	30,558
NORTH CHANNEL WATER AUTHORITY	607473	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	6,682	6,682	6,682	6,682	6,682	6,682
		H	SELF SUPPLIED	607473	10115	GULF COAST AQUIFER	1,673	1,652	1,650	1,647	1,645	1,645
NRG	398300	G	BRAZOS RIVER AUTHORITY	331	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	83,000	83,000	83,000	83,000	83,000	83,000
		H	NRG	398300	3460903926	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	30,000	30,000	30,000	30,000	30,000	30,000
					3461205320	BRAZOS RIVER RUN-OF-RIVER	12,000	12,000	12,000	12,000	12,000	12,000
					3461205325	BRAZOS RIVER RUN-OF-RIVER	28,711	28,711	28,711	28,711	28,711	28,711
RICHMOND-ROSENBERG	999905	G	BRAZOS RIVER AUTHORITY	331	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	7,500	7,500	7,500	7,500	7,500	7,500
		H	SELF SUPPLIED	999905	07915	GULF COAST AQUIFER	7,408	6,111	4,279	4,279	4,279	4,279
SAN JACINTO RIVER AUTHORITY	240	H	SELF SUPPLIED	240	10060	CONROE LAKE/RESERVOIR	21,698	21,698	21,698	21,698	21,698	21,698
					17015	GULF COAST AQUIFER	11,303	11,294	11,279	11,041	8,974	7,359
					3410805271B	TRINITY RIVER RUN-OF-RIVER	31,223	31,223	31,223	31,223	31,223	31,223
					3461004964	SAN JACINTO RIVER RUN-OF-RIVER	37,627	37,627	37,627	37,627	37,627	37,627
SUGAR LAND	999906	H	GULF COAST WATER AUTHORITY	325	3461205168	BRAZOS RIVER RUN-OF-RIVER	12,563	12,563	12,563	12,563	12,563	12,563
		H	SELF SUPPLIED	999906	07915	GULF COAST AQUIFER	20,281	17,020	9,974	9,927	9,927	9,027
THE DOW CHEMICAL CO.	237200	H	SELF SUPPLIED	237200	3461205328B	BRAZOS RIVER RUN-OF-RIVER	137,475	137,475	137,475	137,475	137,475	137,475
TRINITY RIVER AUTHORITY	187	H	SELF SUPPLIED	187	084H0	LIVINGSTON-WALLISVILLE SYSTEM	41,016	41,009	41,009	41,012	41,017	41,021
WHCRWA	999907	H	CITY OF HOUSTON	396200	084H0	LIVINGSTON-WALLISVILLE SYSTEM	20,437	20,437	20,437	20,437	20,436	20,437
		H	SELF SUPPLIED	999907	07915	GULF COAST AQUIFER	3,208	2,640	1,740	1,740	1,740	1,740
					10115	GULF COAST AQUIFER	42,047	20,324	14,781	14,781	14,781	14,781

Notes:
1) WWPs wit contracts to supply w olesale water directly to WUGs
2) WWPs wit contracts to supply anot er WWP

Appendix 3J

Current Surface Water Supplies by Category of Use by Basin by Wholesale Water Provider

This Page Intentionally
Left Blank

Table 3J: Current Surface Water Supply by Category of Water Use by Basin by Wholesale Water Provider

WWP Name	WWP Number	Source ID	Source Name	Source County	Source Basin	Use	Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
BAYTOWN AREA WATER AUTHORITY	15	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MUNICIPAL	17,534	17,534	17,534	17,534	17,534	17,534
BRAZOS RIVER AUTHORITY	331	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	RESERVOIR	BRAZOS	MANUFACTURING	16,400	16,400	16,400	16,400	16,400	16,400
						MUNICIPAL	3,101	3,101	3,101	3,101	3,101	3,101
BRAZOSPORT WATER AUTHORITY	2000	3461205366	BRAZOS RIVER RUN-OF-RIVER	BRAZORIA	BRAZOS	MANUFACTURING	538	538	538	538	538	538
						MUNICIPAL	8,204	8,204	8,204	8,204	8,204	8,204
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	3460804279B	TRINITY RIVER RUN-OF-RIVER	CHAMBERS	TRINITY	IRRIGATION	40,000	40,000	40,000	40,000	40,000	40,000
						MUNICIPAL	4,788	4,788	4,788	4,788	4,788	4,788
CHCRWA	999902	10030	HOUSTON LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	MUNICIPAL	2,375	2,375	2,375	2,375	2,375	2,375
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	3,246	1,930	1,287	1,287	1,287	1,287
CITY OF GALVESTON	316200	08415	GULF COAST AQUIFER	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	1,610	1,590	1,571	1,552	1,539	1,539
		3461205168	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	901	1,034	1,111	1,147	1,173	1,189
		3461205171	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	24,217	24,217	24,217	24,217	24,217	24,217
CITY OF HOUSTON	396200	07915	GULF COAST AQUIFER	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	2,857	2,294	1,513	1,513	1,513	1,513
		084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MANUFACTURING	289,867	289,867	289,867	289,867	289,867	289,867
						MUNICIPAL	355,039	388,070	419,505	458,375	499,927	507,858
		10030	HOUSTON LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	MANUFACTURING	89,499	89,499	89,499	89,499	89,499	89,499
						STEAM ELECTRIC POWER	14,369	14,369	14,369	14,369	14,369	14,369
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	83,239	80,803	81,980	81,980	81,980	81,980
					SAN JACINTO-BRAZOS	MUNICIPAL	147	147	147	147	147	147
		17015	GULF COAST AQUIFER	MONTGOMERY	SAN JACINTO	MUNICIPAL	178	178	178	178	178	178
		3460804277	TRINITY RIVER RUN-OF-RIVER	LIBERTY	TRINITY	IRRIGATION	33,000	33,000	33,000	33,000	33,000	33,000
CITY OF HUNTSVILLE	410000	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MUNICIPAL	3,000	3,000	3,000	3,000	3,000	3,000
		23615	GULF COAST AQUIFER	WALKER	SAN JACINTO	MUNICIPAL	4,597	4,597	4,597	4,597	4,597	4,597
					TRINITY	MUNICIPAL	686	667	640	608	586	567
CITY OF PASADENA	651900	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MANUFACTURING	5,040	5,040	5,040	5,040	5,040	5,040
						MUNICIPAL	33,474	33,474	33,474	33,474	33,474	33,474
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	1,599	1,599	1,599	1,599	1,599	1,599
					SAN JACINTO-BRAZOS	MUNICIPAL	448	448	448	448	448	448
CLEAR LAKE CITY WATER AUTHORITY	159000	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MANUFACTURING	1,792	1,792	1,792	1,792	1,792	1,792
						MUNICIPAL	25,084	25,084	25,084	25,084	25,084	25,084
FORT BEND CO. WCID 1	380	3461105170	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	FORT BEND	SAN JACINTO-BRAZOS	MANUFACTURING	1,000	1,000	1,000	1,000	1,000	1,000
FORT BEND COUNTY WCID #2	821000	07915	GULF COAST AQUIFER	FORT BEND	SAN JACINTO	MUNICIPAL	1,887	1,301	735	727	724	724
					SAN JACINTO-BRAZOS	MUNICIPAL	188	130	73	72	72	72
GALVESTON COUNTY WCID #1	316325	08415	GULF COAST AQUIFER	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	309	309	309	309	309	309
		3461205168	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	2,091	2,091	2,091	2,091	2,091	2,091
		3461205171	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	1,141	1,141	1,141	1,141	1,141	1,141
GULF COAST WATER AUTHORITY	325	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	RESERVOIR	BRAZOS	IRRIGATION	50	50	50	50	50	50
						MANUFACTURING	38,210	38,210	38,210	38,210	38,210	38,210
		3461105357A	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	BRAZORIA	SAN JACINTO-BRAZOS	MANUFACTURING	13,541	13,541	13,541	13,541	13,541	13,541
		3461205168	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	IRRIGATION	2,590	2,590	2,590	2,590	2,590	2,590
						MANUFACTURING	40,012	40,012	40,012	40,012	40,012	40,012
						MINING	517	517	517	517	517	517
						MUNICIPAL	15,695	15,668	15,665	15,662	15,661	15,660
		3461205171	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	IRRIGATION	142	142	142	142	142	142
						MANUFACTURING	10,204	10,204	10,204	10,204	10,204	10,204
						MUNICIPAL	23,148	23,148	23,148	23,148	23,148	23,148
						STEAM ELECTRIC POWER	2,231	2,231	2,231	2,231	2,231	2,231
		3461205322B	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	IRRIGATION	13,197	13,197	13,197	13,197	13,197	13,197
						MANUFACTURING	11,457	11,457	11,457	11,457	11,457	11,457
						MUNICIPAL	9,409	9,409	9,409	9,409	9,409	9,409
LA PORTE AREA WATER AUTHORITY	1095	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MUNICIPAL	9,750	9,750	9,750	9,750	9,750	9,750
LOWER NECHES VALLEY AUTHORITY	140	060A0	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	IRRIGATION	57,700	57,700	57,700	57,700	57,700	57,700
						MUNICIPAL	6,163	6,198	6,246	6,307	6,383	6,477
MISSOURI CITY	999903	07915	GULF COAST AQUIFER	FORT BEND	BRAZOS	MUNICIPAL	315	273	187	187	187	187
					SAN JACINTO	MUNICIPAL	3,883	3,315	2,241	2,241	2,241	2,241
					SAN JACINTO-BRAZOS	MUNICIPAL	11,664	10,125	6,912	6,912	6,912	6,912
		3461205168	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	9,672	9,663	9,659	9,656	9,658	9,645
NFBWA	999901	07915	GULF COAST AQUIFER	FORT BEND	BRAZOS	MUNICIPAL	1,295	1,295	1,220	1,220	1,220	1,220
					SAN JACINTO	MUNICIPAL	18,990	17,740	12,151	12,151	12,151	12,151
					SAN JACINTO-BRAZOS	MUNICIPAL	12,739	12,739	12,739	12,739	12,739	12,739
		084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MUNICIPAL	0	21,434	21,434	21,434	21,434	21,434
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	1,636	470	311	311	311	311
NHCRWA	999904	10030	HOUSTON LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	MUNICIPAL	34,714	34,714	34,714	34,714	34,714	34,714
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	81,243	41,071	30,558	30,558	30,558	30,558
NORTH CHANNEL WATER AUTHORITY	607473	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MANUFACTURING	1,046	1,046	1,046	1,046	1,046	1,046
						MUNICIPAL	5,636	5,636	5,636	5,636	5,636	5,636
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	1,673	1,652	1,650	1,647	1,645	1,645
NRG	398300	120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	RESERVOIR	BRAZOS	STEAM ELECTRIC POWER	83,000	83,000	83,000	83,000	83,000	83,000
		3460903926	TRINITY-SAN JACINTO RIVER RUN-OF-RIVER	CHAMBERS	TRINITY-SAN JACINTO	STEAM ELECTRIC POWER	30,000	30,000	30,000	30,000	30,000	30,000
		3461205320	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	IRRIGATION	12,000	12,000	12,000	12,000	12,000	12,000
		3461205325	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	STEAM ELECTRIC POWER	28,711	28,711	28,711	28,711	28,711	28,711
RICHMOND-ROSENBERG	999905	07915	GULF COAST AQUIFER	FORT BEND	BRAZOS	MUNICIPAL	7,408	6,111	4,279	4,279	4,279	4,279
		120E0	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	RESERVOIR	BRAZOS	MUNICIPAL	7,500	7,500	7,500	7,500	7,500	7,500
SAN JACINTO RIVER AUTHORITY	240	10060	CONROE LAKE/RESERVOIR	MONTGOMERY	SAN JACINTO	IRRIGATION	880	880	880	880	880	880
						MANUFACTURING	12,977	12,977	12,977	12,977	12,977	12,977
						STEAM ELECTRIC POWER	7,841	7,841	7,841	7,841	7,841	7,841
		17015	GULF COAST AQUIFER	MONTGOMERY	SAN JACINTO	MUNICIPAL	11,303	11,294	11,279	11,041	8,974	7,359
		3410805271B	TRINITY RIVER RUN-OF-RIVER	LIBERTY	TRINITY	MANUFACTURING	31,223	31,223	31,223	31,223	31,223	31,223
		3461004964	SAN JACINTO RIVER RUN-OF-RIVER	HARRIS	SAN JACINTO	IRRIGATION	1,476	1,476	1,476	1,476	1,476	1,476
						MANUFACTURING	31,293	31,293	31,293	31,293	31,293	31,293
						MUNICIPAL	4,578	4,578	4,578	4,578	4,578	4,578
SUGAR LAND	999906	07915	GULF COAST AQUIFER	FORT BEND	BRAZOS	MUNICIPAL	8,223	6,901	4,044	4,025	4,025	4,025
					SAN JACINTO	MUNICIPAL	824	691	405	403	403	403
					SAN JACINTO-BRAZOS	MUNICIPAL	11,234	9,428	5,525	5,499	5,499	4,599
		3461205168	BRAZOS RIVER RUN-OF-RIVER	FORT BEND	BRAZOS	MUNICIPAL	12,563	12,563	12,563	12,563	12,563	12,563
THE DOW CHEMICAL CO.	237200	3461205328B	BRAZOS RIVER RUN-OF-RIVER	BRAZORIA	BRAZOS	MANUFACTURING	137,475	137,475	137,475	137,475	137,475	137,475
TRINITY RIVER AUTHORITY	187	084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	IRRIGATION	27,925	27,925	27,925	27,925	27,925	27,925
						MUNICIPAL	32,494	32,487	32,487	32,490	32,495	32,499
WHCRWA	999907	07915	GULF COAST AQUIFER	FORT BEND	SAN JACINTO	MUNICIPAL	3,208	2,640	1,740	1,740	1,740	1,740
		084H0	LIVINGSTON-WALLISVILLE SYSTEM	RESERVOIR	TRINITY	MUNICIPAL	20,437	20,437	20,437	20,437	20,436	20,437
		10115	GULF COAST AQUIFER	HARRIS	SAN JACINTO	MUNICIPAL	42,047	20,324	14,781	14,781	14,781	14,781

Contents

List of Appendices

Chapter 4– Identification, Evaluation and Selection of Water Management Strategies Based on Needs

4.1 Introduction

This chapter describes the analysis required within 31 TAC 357.7 (a) (4-7) regarding the identification of water user groups with needs and identification, evaluation and selection of appropriate water management strategies for the Region H water planning area. Water management strategies have been defined for each of the identified future water shortages within Region H as required by the regional water planning process. Included within this report are:

- Review of the projected water shortages.
- Description of the potentially available water management strategies.
- Definition of the recommended management strategies.
- Allocation of selected strategies to specific Wholesale Water Providers (WWPs) and Water User Groups (WUGs).

In addition to the above, this report contains a description of socioeconomic impacts of not meeting the identified needs.

4.2 Identification of Needs

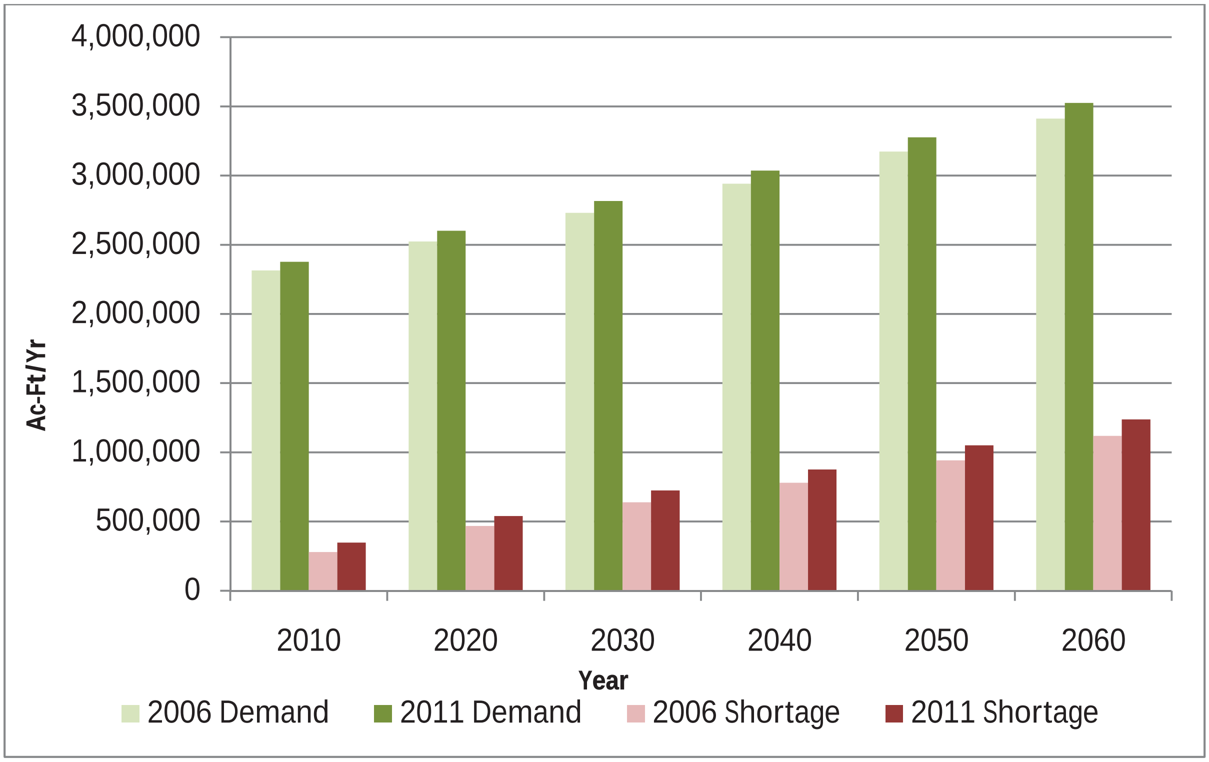
In Chapter 2, water demands were identified for all WUGs. In Chapter 3, water supplies available to Region H were identified and allocated to WUGs and WWPs based on current usage and contracts. By matching the supplies and the demands, projected surpluses and shortages were determined. Table 4A-1 in Appendix 4A lists all WUGs within Region H and their respective surplus or shortage. Projected shortages are referred to as needs. Needs by WWP are shown in *Table 4A-2*.

Total water demands in Region H were 2,087,409 acre-feet per year in the year 2000, and are projected to increase to 3,524,666 acre-feet per year in year 2060. Total current water supplies available to the region were estimated to be 3,556,538 acre-feet per year. Total supply in the year 2060 is expected to be 3,411,210 acre-feet per year. This decline in available supplies is attributable to reservoir sedimentation and limits on groundwater pumping enacted by subsidence districts.

It is estimated that Region H's population will grow from 6,020,078 in the year 2010 to 11,346,082 in the year 2060. This is roughly a four percent increase in population projections over the 2006 RWP. Municipal water demand projections show a projected demand of 1,042,864 acre-feet per year demand in 2010, increasing to a demand of 1,844,817 acre-feet per year in 2060. This represents an approximately 6-7 percent increase over the 2006 RWP. Manufacturing, Irrigation, Steam Electric Power Generation, Mining, and Livestock and livestock demands used in the 2006 RWP were retained in the 2011 RWP.

The sum of the projected shortages in *Table 4-1* is 290,890 acre-feet per year in the year 2010, increasing to 1,236,335 acre-feet per year in the year 2060. The 2011 RWP year 2060 shortage is greater than the projected shortage of 1,069,469 acre-feet per year addressed in the 2006 Region H Plan, as shown in *Figure 4-1*.

Figure 4-1
Comparison of Demands and Shortages: 2006 and 2011 RWPs



Initial shortages were present for all counties in the Region. Water shortages are projected for 337 WUGs (see *Table 4-1*). The projected shortages are predominantly in Brazoria, Fort Bend, Harris and Montgomery Counties, where the majority of the WUGs are located and current groundwater supplies from the Gulf Coast aquifer will be limited due to regulations imposed by subsidence and groundwater conservation districts.

Table 4-1
Projected Shortages by County and Category (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Austin						
MUN	0	-711	-1,189	-1,423	-1,543	-1,746
IRR	0	0	0	0	0	0
MFR	0	-23	-43	-62	-78	-103
MIN	0	-5	-8	-11	-14	-16
TOTAL	0	-739	-1,240	-1,496	-1,635	-1,865

Brazoria	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
MUN	-8,684	-12,338	-17,752	-23,288	-29,741	-36,768
IRR	-103,287	-91,897	-87,474	-84,831	-84,831	-84,831
MFR	-38,936	-81,734	-105,382	-129,211	-150,343	-175,892
MIN	0	-791	-1,026	-1,258	-1,490	-1,708
TOTAL	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Chambers						
MUN	-1,495	-1,896	-2,258	-2,572	-2,908	-3,260
IRR	-27,053	-27,277	-27,411	-27,534	-27,652	-27,753
MFR	-8,264	-9,421	-10,449	-11,473	-12,394	-13,584
MIN	-5,708	-8,818	-10,713	-12,672	-14,658	-16,468
PWR	0	0	0	0	0	0
TOTAL	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Fort Bend						
MUN	-86	-10,283	-48,273	-79,803	-118,879	-166,097
IRR	0	0	0	0	0	0
MFR	0	-771	-3,080	-3,297	-3,441	-3,029
MIN	0	-356	-1,255	-1,280	-1,303	-1,322
PWR	0	0	0	0	0	-8,500
TOTAL	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Galveston						
MUN	-4,279	-5,435	-6,054	-6,171	-6,301	-6,458
IRR	-9,194	-9,204	-9,220	-9,220	-9,220	-9,219
MFR	0	0	0	0	0	0
MIN	-31	-45	-52	-59	-66	-73
PWR	-2,803	-1,782	-2,461	-3,288	-4,297	-5,526
TOTAL	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Harris						
MUN	-23,375	-147,451	-210,034	-250,767	-290,634	-369,173
IRR	0	0	0	0	0	0
MFR	-27,495	-37,630	-46,275	-53,917	-59,635	-56,766
MIN	-143	-295	-390	-485	-581	-666
PWR	-400	-9,549	-13,602	-18,542	-24,564	-31,904
TOTAL	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Leon						
MUN	0	-248	-361	-328	-286	-309
IRR	0	0	0	0	0	0
MFR	0	-128	-253	-379	-493	-599
MIN	0	0	0	0	0	0
TOTAL	0	-376	-614	-707	-779	-908

Liberty	2010	2020	2030	2040	2050	2060
MUN	0	-1,281	-2,494	-3,719	-5,127	-6,847
IRR	-11,846	-12,444	-13,930	-15,555	-17,478	-19,640
MFR	0	-72	-144	-218	-285	-343
MIN	0	-67	-124	-178	-237	-300
PWR	0	-1,278	-1,995	-2,869	-3,934	-5,233
TOTAL	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363
Madison						
MUN	-1	-101	-172	-156	-216	-312
IRR	0	0	0	0	0	0
MFR	0	-29	-56	-83	-107	-138
MIN	0	0	0	0	0	0
TOTAL	-1	-130	-228	-239	-323	-450
Montgomery						
MUN	-17,149	-46,415	-67,850	-79,236	-115,706	-157,424
IRR	0	0	0	0	0	0
MFR	-469	-988	-1,384	-1,756	-2,129	-2,504
MIN	-110	-216	-279	-331	-382	-425
PWR	0	0	0	-27	-2,181	-4,809
TOTAL	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Polk						
MUN	0	-115	-202	-268	-379	-507
IRR	0	0	0	0	0	0
MIN	0	-2	-3	-4	-5	-6
TOTAL	0	-117	-205	-272	-384	-513
San Jacinto						
MUN	0	-296	-525	-683	-778	-849
IRR	0	0	0	0	0	0
MFR	0	-4	-8	-12	-15	-20
MIN	0	0	0	0	0	0
TOTAL	0	-300	-533	-695	-793	-869
Trinity						
MUN	0	0	0	0	0	0
IRR	0	0	0	0	0	0
MIN	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0
Walker						
MUN	0	-96	-155	-196	-230	-282
IRR	0	0	0	0	0	0
MFR	0	-719	-1,500	-1,777	-2,154	-2,571
MIN	0	0	0	0	0	0
TOTAL	0	-815	-1,655	-1,973	-2,384	-2,853

Waller	2010	2020	2030	2040	2050	2060
MUN	-82	-1,440	-2,917	-4,532	-6,541	-8,902
IRR	0	-474	0	-13	-1,592	-3,398
MFR	0	-12	-23	-34	-44	-55
MIN	0	0	0	0	0	0
TOTAL	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Region H Total						
MUN	-55,151	-228,106	-360,236	-453,142	-579,269	-758,934
IRR	-151,380	-141,296	-138,035	-137,153	-140,773	-144,841
MFR	-75,164	-131,531	-168,597	-202,219	-231,118	-255,604
MIN	-5,992	-10,595	-13,850	-16,278	-18,736	-20,984
PWR	-3,203	-12,609	-18,058	-24,726	-34,976	-55,972
TOTAL	-290,890	-524,137	-698,776	-833,518	-1,004,872	-1,236,335

4.3 Potential Water Management Strategies

Potentially feasible water management strategies (WMS) were identified in three ways. First, strategies recommended in the 2006 Region H Water Plan for either implementation or additional study were considered potentially feasible. Next, new strategies were solicited during the scope development period for the 2011 Water Plan. Finally, sponsoring agencies that conducted independent strategy studies could bring their reports to the planning group and request they be considered in the plan. As examples, the Brazos River Authority System Operations supply was revised during the planning cycle, and several new GRPs were brought to the RHWPG during the planning cycle.

4.3.1 Studies by the RHWPG and Others

Potential water management strategies were defined based on the above determination of needs. Strategies were updated and configured to address the specific types and nature of identified shortages. The following potential management strategies were identified:

Conservation Strategies:

- Industrial Conservation
- Irrigation Conservation
- Municipal Conservation

Contractual Strategies:

- Expand/Increase Current Contracts (see WUG-Level Contracts)
- New Contracts from Existing Supplies (see WUG-Level Contracts)
- Reallocation of Existing Supplies (see WUG-Level Contracts)
- TRA to SJRA Contract
- TRA to Houston Contract
- WUG-Level Contracts

- WWP Contracts

Groundwater Strategies

- Expanded Use of Groundwater
- Interim Strategies
- New Groundwater Wells for Livestock

Groundwater Reduction Plans

- CHCRWA GRP (see CHCRWA Transmission)
- City of Houston GRP (see COH Treatment Expansion)
- City of Missouri City GRP
- Fort Bend MUD 25 GRP
- Fort Bend WCID 2 GRP
- NFBWA GRP (see NFBWA Transmission)
- NHCRWA GRP (see NHCRWA Transmission)
- Pecan Grove GRP
- Richmond/Rosenberg GRP
- River Plantation GRP
- SJRA WRAP
- Sugar Land GRP
- WHCRWA GRP (see WHCRWA Transmission)

Reservoir Strategies:

- Allens Creek Reservoir
- Brazoria County Off-Channel Reservoir
- Dow Off-Channel Reservoir
- Fort Bend County Off-Channel Reservoir
- GCWA Off-channel Reservoir
- Millican Reservoir
- Little River Off-Channel Reservoir
- Other Potential Reservoirs

Reuse Strategies:

- Fulshear Reuse
- Houston Indirect Reuse
- Montgomery County MUD 8/9 Indirect Reuse

- NHCRWA Indirect Reuse
- Wastewater Reuse for Industry
- Wastewater Reclamation for Municipal Irrigation

Permit Strategies

- Brazos River Authority System Operations Permit
- Houston Bayous Permit

Other Strategies

- Brazoria County Interruptible Supplies for Irrigation
- Brazos Saltwater Barrier
- Freeport Desalination
- Montgomery County MUD 8/9 Brackish Water Desalination
- Sabine to Region H Transfer

Infrastructure Strategies

- CHCRWA Transmission Line
- CHCRWA Internal Distribution (see CHCRWA Transmission Line)
- CLCND West Chambers System
- COH Distribution Expansion (see COH Treatment Expansion)
- COH Treatment Expansion
- Huntsville WTP
- Harris County MUD 50 WTP
- LLWSSSC Surface Water Project
- Luce Bayou Transfer
- NFBWA Internal Distribution (see NFBWA Transmission Line)
- NFBWA Shared Transmission
- NHCRWA Internal Distribution (see NHCRWA Transmission Line)
- NHCRWA Transmission Line
- Pearland SWTP
- Sealy Groundwater Treatment Expansion
- WHCRWA Internal Distribution (see WHCRWA Transmission Line)
- WHCRWA Transmission Line

For each of these management strategies a detailed technical memorandum is provided in Appendix 4B. Not all of the strategies evaluated are based on developing additional water. Several strategies consist of water transfer facilities only (e.g., Luce Bayou, Authority Transmission strategies), or allow for lower treatment costs (Brazos Saltwater Barrier). Expanded use of groundwater addresses the requirements to fully develop existing groundwater supplies, with consideration given to the regulatory guidelines set by groundwater conservation districts. Other strategies only involve the contractual exchange of water supplies between various water suppliers (e.g., the TRA / City of Houston water transfers). These strategies recognize the need to transfer supplies from areas of excess to the specific areas of need, mainly within the western and lower portions of the region.

No groundwater transport strategies from remote areas were investigated since there is projected to be full utilization of the regulated or sustainable yield of all of the aquifers within the counties of highest water demand. The Region H Water Planning Group has elected to not consider strategies that move groundwater out of the county of origin.

The technical memorandum reviewing potential surface water reservoir projects was updated and is included in Appendix 4B. Separate, more detailed technical memoranda are included for Allens Creek Reservoir; GCWA,,Brazoria County, Dow, and Fort Bend County Off-Channel Reservoirs; and Millican (Panther Creek Dam) Reservoir.

The Brazos River Authority submitted a water right application in 2004 for additional yield gained through System Operations. The technical study in support of the application determined that additional firm yield could be realized from the BRA system when their reservoirs are operated as a system instead of as separate sources. The additional yield comes from a combination of reservoir capacity not recognized in the existing permits, efficiencies realized when operated as a system, and the ability to use unreliable river flows, when available, to meet demands and thus increase the amount of stored water for drought periods.

Governor Perry directed the TWDB in 2002 to develop a seawater desalination demonstration project. The TWDB selected three potential sites, in the Lower Rio Grande Valley – Brownsville, Corpus Christi and Freeport, this last being within Region H. The Freeport study recommends a 10-mgd demonstration facility be constructed, with the potential for future expansions up to 30-mgd. Similarly to the 2006 RWP, the Freeport Desalination Project was selected as a water management strategy in the 2011 RWP. Finally, the Brazos G Water Planning Group has studied several reservoirs in the middle and upper Brazos River Basin, and has modeled these sites using the Watershed Availability Model.

The technical memoranda reviewing potential water management strategies are included in Appendix 4B. Assessment of each of the potential management strategies conducted as a part of this study included an evaluation of cost, environmental impacts, impacts on other water resources, and additional factors as applicable. Discussions of necessary implementation activities associated with various strategies are also included in the technical memoranda. In order to assess the strategies on a comparable cost basis, a detailed set of unit costs was developed and applied to each alternative. A description of the costing methodology is contained within Appendix 4C.

4.3.2 Need for Interbasin Transfers

As can be seen by reviewing the current water supplies and potential water management strategies, Region H is highly dependent upon the interbasin transfer of water. Water is currently imported from Lake Livingston and the Trinity River to meet demands in Harris County, and from the Brazos River to meet demands in Galveston County. Future strategies recommend fully utilizing existing supplies in all basins, which will require transferring additional water from the Trinity Basin to the San Jacinto basin for Harris and Montgomery Counties. Most important of these in the near term is the Luce Bayou Transfer, which will move available water from the Trinity River into Lake Houston where it can be utilized by multiple entities. An additional interbasin conveyance may be required in order to facilitate the transfer of water from the Trinity Basin to SJRA customers in Montgomery County.

Under current law, amending a water right to allow the interbasin transfer of supply makes the water right junior to all other rights in the source basin, unless the water is diverted to a neighboring coastal basin. Because reliability is partially based on the seniority of a water right, this provision in the water code makes new interbasin transfers difficult to accomplish. However, water transferred from a river basin to the adjoining coastal basin is not subject to this interbasin transfer requirement. Therefore, transfers from the Brazos River to Galveston County or from the Trinity River to eastern Harris County are not at risk under this provision. However, a significant portion of the growth and demands to be met are in the San Jacinto basin. Some of the water identified to meet this demand is already permitted for interbasin transfer, including the TRA portion of Lake Livingston.

4.3.3 Drought Management

The Regional Water Planning Guidelines require that drought management strategies be considered for each identified need. If drought management is not selected as a strategy, current TWDB policy for regional water supply planning requires that reasons for its exclusion must be documented. Drought management strategies may include water demand management.

The supply and demand values used for this plan are based on estimated drought of record conditions. Under non-drought conditions, the region will have an overall surplus of supply. This surplus does not coexist with the growing demand areas. The majority of available supply is in Lake Livingston, which is in the Trinity Basin. However, the majority of the growth is occurring in Brazoria, Fort Bend, Harris and Montgomery Counties, which are in the Brazos and San Jacinto Basins. To meet the demands where they occur, supply from the Trinity must be transferred into the San Jacinto Basin. Once that infrastructure is constructed, it is not “drought-susceptible”, because the permitted yield of the underlying water rights does not exceed the drought yield. Similarly, surface supplies are replacing groundwater due to subsidence regulations, and that supply is also firm.

The TCEQ requires that supplies used to meet municipal demands be firm (drought-of-record) yields, so none of the non-reliable supply may be assigned to meet future growth. It is generally more costly to transfer existing supply from the Trinity Basin than to develop new supply in-basin; therefore, the new in-basin projects with firm yields were recommended in the plan as being superior to interbasin transfers.

According to the February 2009 report titled *Region H Water Planning Group Drought Management Study*, the implementation of a drought contingency plan could minimize the drawdown of Region H reservoirs and shorten the duration of impacts on lake levels during a repeat of drought-of-record conditions. However, the analysis indicated that these drought contingency measures are relatively insignificant in terms of an annual increased supply. The results of this study indicate that while drought contingency planning is a critical component of water supply management and may provide short-term benefits during severe drought conditions, drought management alone will not replace any recommended long term water management strategies. These results were developed based on information from the 2006 RWP. The results of the *Drought Management Study* are discussed in further detail in Chapter 6 of this RWP.

The shortages identified in the plan are based on future demands (based on projected growth) exceeding the firm (drought) yield of existing supplies. Except for some specific irrigation demands, the strategies recommended to meet these shortages also reflect estimated drought yields. Because Region H was able to address all projected municipal and manufacturing shortages through allocation of existing supplies, conservation, and development of new supplies, no unmet demands remain to be addressed through drought management strategies.

This does not preclude some WUG's from electing to use drought management in lieu of a recommended strategy. The best example of this is for irrigation. Region H recommends irrigation conservation as a management strategy in those counties with projected irrigation shortages. However, portions of those irrigation demands are met today through the use of water rights which are not fully reliable, backed up by one-year contracts for reliable supply as needed. Irrigators holding interruptible water rights may choose not to implement conservation (at an annual cost), but instead choose to reduce their irrigated acreage during a drought year (for a discrete cost), or enter into long-term contracts for reliable surface water from a wholesale supplier (which will be available in the eastern counties). That is an individual economic decision and the Region H plan recognizes the flexibility of these irrigators to exercise that option.

Region H has sufficient supply available from existing sources and recommended strategies to meet near-term and long-term needs under projected drought of record conditions. In the counties with greatest projected demands, the groundwater use from the Gulf Coast aquifer is limited through Subsidence District regulations and not by aquifer productivity. While conjunctive use of the aquifer is not the recommended drought response, it remains as a short-term safety net while new surface supplies are developed.

Municipalities and water providers throughout the region have published drought contingency plans. In general, these plans are designed to address short-term periods of limited water availability through public notice and outdoor water use restrictions. While these methods are effective over a limited period of time, they are unlikely to overcome the drought of record, which extended through a period of approximately five years. Only the development of reliable supplies to meet projected growth will protect the region from the economic impacts of a prolonged drought.

In the presence of emergency conditions, emergency transfers of surface water are granted by the Texas Commission on Environmental Quality during periods where an imminent threat to public health and safety exist, including multi-year droughts, spikes in demands, or failure of water supply systems where demands are unable to be met by available resources. Emergency transfers of water, however, are only granted on an interim basis not lasting more than 180 days, and are not a reliable source of additional supplies to meet increased demands. Emergency transfers should only be considered as temporary, and just as they will not provide new long term sources of water, they will not affect water-right holders over long term periods. As the regional water planning process considers supplies and demands over decadal periods, temporary emergency transfers of water were not considered. As all supplies allocated are considered available during drought of record (DOR) conditions, the need for additional supplies in the water planning process are due to unmet demands rather than temporary unavailability of supplies. If shortages are identified in a decade within the planning period, they are met with new supplies developed in a WMS.

4.3.4 Interruptible Supplies

TWDB guidelines require use of "firm" water supplies for regional water supply planning for allocation to meet future needs for all types of water uses. Firm water supplies are those supplies predicted to be 100% reliable during the drought of record conditions While this planning criteria represents a sound and conservative approach for water users that require supplies with a high degree of reliability such as municipal and manufacturing demands, some types of water uses such as irrigated agriculture, may be able to utilize surface water supplies that are less than fully dependable during a drought of record by suspending irrigation in favor of dry-land crops during these periods. These less than 100% reliable supplies are called "interruptible" supplies.

A Region H study conducted early during this round of planning (February 2009 report titled *Region H Water Planning Group Interruptible Supply Study*) evaluated the feasibility of using available interruptible surface water supplies as a substitute for existing firm surface water supplies for certain uses, notably irrigated agriculture. The goal of this study was to determine if there were additional firm supplies that could be made available to municipal and manufacturing users that were currently allocated to irrigation demands. For many reasons outlined in detail in the 2009 *Region H Water Planning Group Interruptible Supply Study*, the study concluded that there was little to no opportunity for this goal to be accomplished. The primary limitation on the use of interruptible supply was that, since there are not many irrigators using firm supplies, conversion to interruptible supply would not free a significant volume of firm water. Thus, offsets of irrigation demands on firm water supply cannot provide to other users such as municipal or industrial WUGs. However, the analysis of existing water rights revealed significant quantities of existing permitted interruptible water in the Brazos, San Jacinto–Brazos, San Jacinto and the Trinity Basin that could potentially be used to supply major agricultural irrigation demands. The largest quantity of interruptible supply is found in the Brazos Basin, primarily from rights held by GCWA, which could be utilized in both the Brazos and the San Jacinto – Brazos Basins through existing infrastructure. This new WMS (i.e. use of existing permitted interruptible water supplies for irrigated agricultural demands) has subsequently been adopted for the 2011 RWP as the recommended method to supply the agricultural demand for Brazoria County. This strategy also deserves further consideration in the next round of planning for Fort Bend County.

4.4 Strategy Evaluation and Selection

In evaluating the potential water management strategies, the RHWPG made three key assumptions. First, WUGs would continue to develop groundwater until it was fully utilized to its maximum availability. This is based upon the observed pattern of development in the region, where the Gulf Coast aquifer is available in all of the southern counties. Second, those WUGs currently receiving water from WWPs would be able to increase their contract amounts until the WWP supplies were fully allocated. This assumes the use of existing supplies conveyed through existing infrastructure wherever possible. Finally, the RHWPG assumed that every municipal WUG with a projected shortage would utilize conservation before seeking out or increasing a WWP contract. Based on these assumptions, the projected shortage in 2060 is reduced from 1,236,335 acre-feet to 973,857 acre-feet (see *Table 4-2 and Figure 4-2*).

Figure 4-2
Remaining Shortages after Conservation and Expanded Groundwater Use

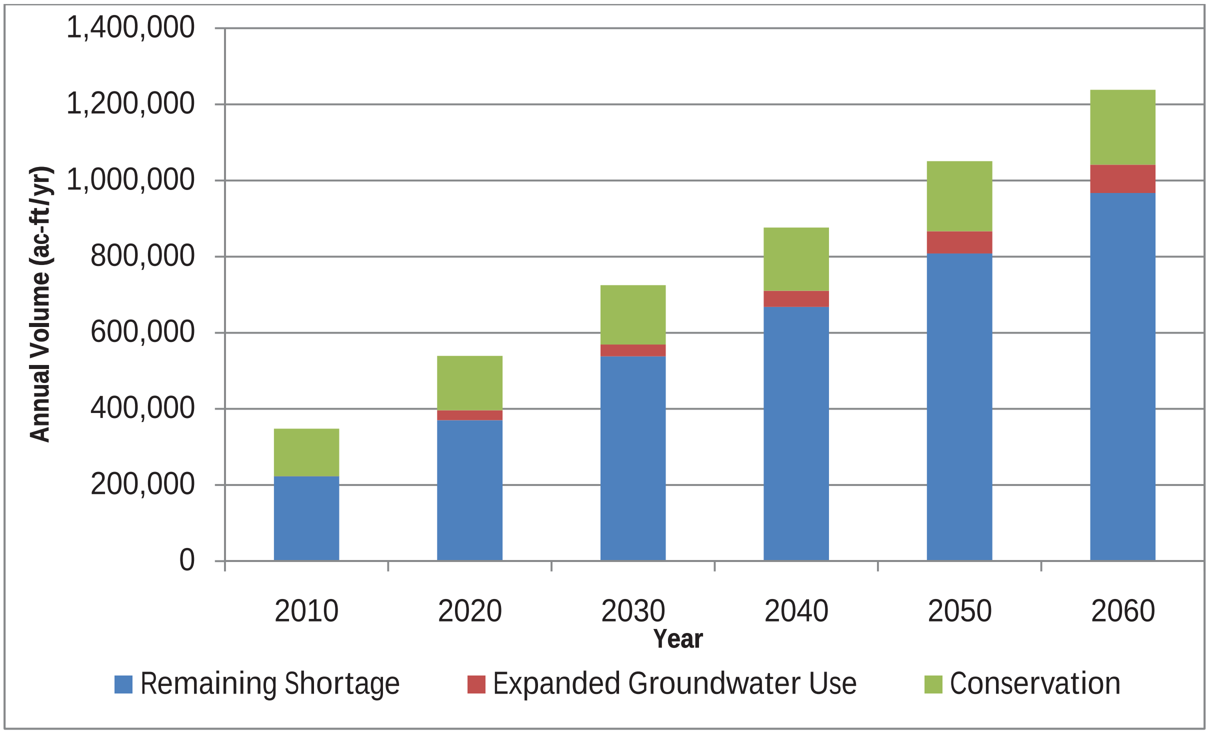


Table 4-2
Initial and Net Shortages by County (ac-ft/yr)

Austin	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Initial Shortage	0	-739	-1,240	-1,496	-1,635	-1,865
Expanded GW	0	739	1,240	1,496	1,635	1,865
Municipal Conservation	0	223	251	265	273	285
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	223	251	265	273	285

Brazoria						
Initial Shortage	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Expanded GW	0	4,049	12,988	13,515	15,658	16,209
Municipal Conservation	1,476	2,610	2,978	3,249	3,567	3,918
Contract Expansions	7,750	7,750	7,750	7,750	7,750	7,750
Net Shortage	-141,681	-172,351	-187,918	-214,074	-239,430	-271,322

Chambers						
Initial Shortage	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Expanded GW	0	577	681	796	905	1,010
Municipal Conservation	137	195	219	239	263	291
Contract Expansions	0	0	0	0	0	0
Net Shortage	-42,383	-46,640	-49,931	-53,216	-56,444	-59,764

Fort Bend						
Initial Shortage	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Expanded GW	0	6,886	3,423	3,813	4,378	5,052
Municipal Conservation	1,435	7,077	10,277	12,253	14,678	17,497
Contract Expansions	0	367	1,295	1,226	1,225	1,016
Net Shortage	1,349	2,920	-37,613	-67,088	-103,342	-155,383

Galveston						
Initial Shortage	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Expanded GW	0	811	1,352	1,350	1,352	1,352
Municipal Conservation	768	846	886	896	903	914
Contract Expansions	0	25,630	25,630	25,630	25,630	25,630
Net Shortage	-15,539	10,821	10,081	9,138	8,001	6,620

Harris						
Initial Shortage	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Expanded GW	0	15,481	27,659	27,693	27,727	27,560
Municipal Conservation	37,292	46,836	51,902	56,748	61,656	66,947
Contract Expansions	0	108,852	66,039	51,840	42,538	31,971
Net Shortage	-14,121	-23,756	-124,701	-187,430	-243,493	-332,031

Leon	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Initial Shortage	0	-376	-614	-707	-779	-908
Expanded GW	0	376	614	707	779	908
Municipal Conservation	0	126	140	124	107	116
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	126	140	124	107	116
Liberty						
Initial Shortage	-11,846	-15,150	-18,703	-22,561	-27,093	-32,408
Expanded GW	0	2,545	4,606	6,831	9,431	12,589
Municipal Conservation	0	539	641	744	868	995
Contract Expansions	0	0	0	0	0	0
Net Shortage	-11,846	-12,066	-13,456	-14,986	-16,794	-18,824
Madison						
Initial Shortage	-1	-130	-228	-239	-323	-450
Expanded GW	0	130	228	239	323	450
Municipal Conservation	1	91	110	112	116	119
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	91	110	112	116	119
Montgomery						
Initial Shortage	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Expanded GW	0	5,615	4,471	5,614	9,034	11,820
Municipal Conservation	4,460	6,007	7,384	8,838	10,795	13,089
Contract Expansions	0	0	0	0	0	0
Net Shortage	-13,268	-35,997	-57,658	-66,898	-100,569	-140,253
Polk						
Initial Shortage	0	-117	-205	-272	-384	-513
Expanded GW	0	117	205	272	384	513
Municipal Conservation	0	158	173	180	187	198
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	158	173	180	187	198
San Jacinto						
Initial Shortage	0	-300	-533	-695	-793	-869
Expanded GW	0	542	928	984	1,007	1,060
Municipal Conservation	19	148	163	174	181	184
Contract Expansions	0	0	0	0	0	0
Net Shortage	19	390	558	463	395	375
Trinity						
Initial Shortage	0	0	0	0	0	0
Expanded GW	0	36	36	21	0	0
Municipal Conservation	0	2	1	0	0	0
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	38	37	21	0	0

Walker	2010	2020	2030	2040	2050	2060
Initial Shortage	0	-815	-1,655	-1,973	-2,384	-2,853
Expanded GW	0	816	1,651	1,963	2,374	2,843
Municipal Conservation	0	68	74	89	90	92
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	69	70	79	80	82
Waller						
Initial Shortage	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Expanded GW	0	1,447	2,231	3,644	5,382	7,431
Municipal Conservation	17	392	497	592	708	849
Contract Expansions	0	0	0	0	0	0
Net Shortage	-65	-87	-212	-343	-2,087	-4,075
Region H Total						
Initial Shortage	-290,890	-524,137	-698,776	-833,518	-1,004,872	-1,236,335
Expanded GW	0	40,159	62,297	68,916	80,337	90,617
Municipal Conservation	45,605	65,318	75,696	84,503	94,392	105,494
Contract Expansions	7,750	142,599	100,714	86,446	77,143	66,367
Net Shortage	-237,535	-276,061	-460,069	-593,653	-753,000	-973,857

4.4.1 Evaluation of Water Management Strategies

Potential water management strategies (WMSs) were compared using a screening table (See Table 4A-3 in Appendix 4A), with the required environmental assessments summarized in Table 4A-4. The comparison table summarized project yield, capital, O&M, and unit water costs, impacts on wetlands habitats and B&E flows, and impacts on landform. Evaluation criteria included cost, yield, location, water quality, environmental land and habitats, local preference, institutional constraints or risk of non-implementation, impacts on environmental flows and impacts on other water management strategies. In each of the evaluation categories, the WMS was rated positively (+1), neutral (0) or negatively (-1), using evaluation criteria summarized in *Table 4-3*, below. As would be expected, water conservation and full use of existing supplies rated the highest of the potential strategies. Direct wastewater reuse for industry also rated highly. Although direct reuse is more costly than using existing supply, it is less expensive than developing a new freshwater source, and has fewer environmental impacts. Contractual transfers of water, Allens Creek, GCWA Off-channel Reservoir, Brazoria Off-channel Reservoir, Fort Bend Off-channel Reservoir, Freeport Desalination, Brazos Saltwater Barrier, and indirect reuse were all rated positively. All of the above WMSs were rated positively in the cost-benefit-impact analysis. Certain WMSs (i.e., the inter-basin transfer of supply from east Texas and the Millican Reservoir) were rated negatively due to the significant habitat and environmental flow impacts these projects entail.

The combined effects of WMSs were considered through the use of the TCEQ Water Availability Model, described in Section 4.6 and Appendix 4D. For this modeling scenario, the recommended WMSs from the 2006 Regional Water Plans were incorporated into the model. As described in detail in Section 4.6, the cumulative effect of the current State Water Plan on Galveston Bay was a slight decrease in freshwater inflows after 2010, with flows rising after 2040. Results of this modeling, combined with modeling from the 1st biennium of the 2011 RWP, indicate that these changes are predominantly due to upstream Region C WMSs (reduced return flows due to Region C reuse) rather than WMSs within Region H. Additional modeling was carried out to determine impacts of new WMS on environmental flows. Results of this modeling can be found in Appendix 4E.

Table 4-3
WMS Rating Criteria

	Rating Criteria		
Category	**-1**	**0**	**1**
Cost	>$200/ac-ft	<$200/ac-ft	<$100/ac-ft
Yield	Size is too small or too large for need	Size is flexible or meets needs	Size can be adjusted to optimum
Location	IBT required, long distance or outside Region H.	No IBT required. Conveyance required.	No IBT required. Relatively near demand.
Water Quality	Quality of supply is reduced.	No known water quality issues.	Existing water quality problems are reduced.
Environmental Land & Habitat	Significant environmental issues and opposition.	Environmental impacts can be mitigated. Limited concerns.	Limited or no known impacts.
Local Preference	No local support. Significant opposition.	Some local support. Limited opposition.	Widespread local support. Multi-use benefits likely.
Institutional Constraints / Risk of Implementability	Permits opposed. Significant property required.	Permits expected with minimal problems. Property available.	Permits issued. Facilities or land owned. Water available.
Impacts on Environmental Flows	Reduces instream or B&E flows.	No impact.	Increases instream or B&E flows.
Impacts on Other Management Strategies	Negative impact.	No impact.	Positive impact.

4.4.2 Water Conservation

Water loss audits were available and considered (see Chapter 1) by the Planning Group; the Group, however, did not opt to use this information in developing WMS. They did, however, elect to use a specific methodology for conservation, as detailed in Chapter 6. The water loss audits performed by water utilities in the region showed a high level of inaccuracy in the water loss estimates, suggesting that utilities in the region should refine their water accounting procedures for future audits. For this reason, a unique methodology for developing potential conservation savings was developed. Conservation was applied to WUGs (as described in Chapter 6) before supplies were given. This decreased WUG demands, minimizing water management strategy water that was required to meet potential shortages.

The RHWPG advocates water conservation for all water users in the Region, noting that “the least expensive water you can get is the water you already have.” Some conservation will be realized through low-flow water fixture laws (embedded in the demand estimates), and from new energy-efficient clothes washers, but more savings can be achieved. Every water user group and provider is encouraged to establish an aggressive water conservation goal. The Water Conservation Implementation Task Force established by the 78th Texas Legislature recommended a goal of reducing demand by 1% each year to achieve an average demand of 140-gpcd. Since the median municipal water demand in this region is 135-gpcd, and since conservation programs are voluntary and they require an investment of time and resources to implement, this plan only reflects water conservation as a water management strategy for water user groups with projected shortages and for those that specifically asked to reflect their program in the plan tables. These savings are conservatively estimated at 5.5 to 7 percent of total demand, based on current best management practices that are producing results. Conservation was applied as a WMS to all municipal and irrigation WUGS with shortages as well as to those with water conservation plans.

4.4.3 Selection of Water Management Strategies

To facilitate the strategy selection process, water needs and potential WMSs were grouped and evaluated on a county-by-county basis. Efforts were then made to select the best-rated WMSs to meet the needs in those counties. In Austin, Leon, Liberty, Madison, Polk, Trinity, and Walker Counties, a combination of water conservation and existing supply expansion was sufficient to meet the projected shortages. Several large WMSs, (BRA System Operations, Allens Creek Reservoir, Off-Channel Reservoirs) were required to meet the needs of Fort Bend and Brazoria Counties. In Harris County several new WMSs were required to meet projected demands, including direct and indirect reuse, expansion of TRA contracts for supply from Lake Livingston, and a new reservoir (Allens Creek Reservoir) in the Brazos basin. In Montgomery County, the transfer of Trinity Basin supply facilitated the full use of existing supplies, which, along with use of interim strategies and reuse, were sufficient to meet the projected shortages. A summary is provided in *Table 4-4*, below, and shown in more detail in Table 4A-5 and 4A-6 in Appendix A.

Some WMSs from the 2006 Region H Water Plan were replaced with new WMSs as a result of this selection process. Little River (off-channel) Reservoir and Non-municipal contractual transfers are no longer required to meet identified shortages and were not recommended for selection in the 2011 RWP.

Many of the recommended WMSs are required to provide the conveyance and treatment of existing or proposed future strategies to the location of the projected shortage, but do not create new or additional supply alone. The Luce Bayou Transfer is a conveyance project that would be used in conjunction with Expanding Current Contracts, New Contracts from Existing Supply, and TRA to Houston contract expansions. The Brazos Saltwater Barrier would protect current water right holders in the lower Brazos from saltwater migration during periods of low flows and increased future diversions (i.e., full utilization of authorized diversions). Some of the recommended water rights applications produce no firm yield, specifically the Houston/SJRA joint permit application for interruptible supply from the San Jacinto River. It is included to allow the applicants to develop operational plans for conjunctive use of these local supplies with firm supplies transferred from the Trinity River. While this permit would reduce flows into Upper Galveston Bay, the affects would be mitigated by wastewater return flows back into the source streams. The offset Trinity River supplies would remain in-basin and flow into Trinity Bay, where the historic freshwater inflow demand is the greatest. The Brazoria County Interruptible Supplies for Irrigation strategy is by definition not firm. Finally, there is no new yield associated with any of the infrastructure-only strategies.

There were no water quality concerns with any of the recommended WMS. That is, conventional water treatment would provide supply acceptable for the typical WUG needs, unless the strategy itself recommended a specific water quality improvement. These strategies included direct reuse of wastewater, which required filtration and reverse osmosis treatment, and the Brazos saltwater barrier, which protects the quality of existing supply at current diversion points.

Table 4-4
Recommended Water Management Strategies

WMS	Max Project Volume (ac-ft/yr)	WWP Capital Cost $	WUG Capital Cost $	Starting Decade
Conservation Strategies:				
Industrial Conservation	TBD	$0	TBD	2010
Irrigation Conservation	77,881	$0	$757,436	2010
Municipal Conservation	105,494	$0	$0	2010
Contractual Strategies:				
Expand/Increase Current Contracts	142,599	$0	See Contracts	2010
New Contracts from Existing Supplies	83,558	$0	See Contracts	2010
Reallocation of Existing Supplies	N/A	$0	See Contracts	2010
TRA to SJRA Contract	76,476	$302,781,597	See Contracts	2040
TRA to Houston Contract	123,524	See Luce Bayou	See Contracts	2030
WUG-Level Contracts[1]	N/A	$0	$2,390,273,157	2010
WWP Contracts	N/A	$0	$0	2010
Groundwater Strategies:				
Expanded Use of Groundwater	90,617	$0	$165,928,999	2010
Interim Strategies	45,512	$0	$86,701,535	2010
New Groundwater Wells for Livestock	41	$0	$18,635	2020
Groundwater Reduction Plans:				
CHCRWA GRP	4,806	See CHCRWA Trans.	$0	2010
COH GRP	TBD	See COH Treatment	$58,235,873	2010
City of Missouri City GRP	17,562	$92,070,990	$6,618,706	2010
Fort Bend MUD 25 GRP	589	$0	$776,145	2020
Fort Bend WCID 2 GRP	5,753	$24,828,857	$0	2020
NFBWA GRP[2]	106,402	See NFBWA Trans.	$1,638,063	2020
NHCRWA GRP[2]	117,755	See NHCRWA Trans.	$17,814,585	2010
Pecan Grove GRP	1,700	$0	$15,960,000	2020
Richmond/Rosenberg GRP	7,500	$117,220,150	$0	2020
River Plantation GRP	368	$0	$484,926	2010
SJRA WRAP[3]	129,010	$900,000,000	$217,856,853	2020
Sugar Land GRP	9,796	$161,360,049	$6,360,101	2020
WHCRWA GRP[2]	78,839	See WHCRWA Trans	$35,268,970	2010
Infrastructure Strategies:				
CHCRWA Transmission Line	4,806	TBD	N/A	2010
CHCRWA Internal Distribution	4,806	TBD	N/A	2010
CLCND West Chambers System	2,800	$20,380,000	See Contracts	2020
COH Distribution Expansion	TBD	$261,040,000	N/A	2010
COH Treatment Expansion	Varies by decade	$2,045,672,161	N/A	2010
Harris County MUD 50 WTP	632	$0	$6,131,600	2020

Huntsville WTP	11,200	$61,023,906	$0	2010
LLWSSSC Surface Water Project	954	$0	$3,087,974	2010
Luce Bayou Transfer	450,000	$253,916,914	$0	2020
NFBWA Internal Distribution	106,402	$225,000,000	N/A	2020
NFBWA Shared Transmission Line	71,876	$213,000,000	N/A	2020
NHCRWA Internal 2010 Distribution	34,714	$153,149,640	N/A	2010
NHCRWA Internal 2020 Distribution	91,167	$345,292,192	N/A	2020
NHCRWA Internal 2030 Distribution	117,755	$37,439,584	N/A	2030
NHCRWA Transmission 2010	34,714	$80,690,624	N/A	2010
NHCRWA Transmission 2020	91,167	$172,558,512	N/A	2020
NHCRWA Transmission 2030	117,755	$0	N/A	2030
Pearland SWTP	13,420	$0	$265,000,000	TBD
Sealy GW Treatment Expansion	888	$0	$6,450,000	2020
WHCRWA Internal Distribution	78,839	$552,472,000	N/A	2010
WHCRWA Transmission Line	78,839	$290,084,193	N/A	2010
Reservoir Strategies:				
Allens Creek Reservoir	99,650	$222,752,400	See Contracts	2020
Brazoria County Off-channel Reservoir	24,100	$173,898,602	See Contracts	2060
Dow Off-channel Reservoir	21,800	$124,468,000	See Contracts	2020
Fort Bend County Off-channel Reservoir	46,000	$202,514,788	See Contracts	2050
GCWA Off-channel Reservoir	39,500	$197,448,012	See Contracts	2030
Reuse Strategies:				
Fulshear Reuse	430	$0	$566,625	TBD
Houston Indirect Reuse	128,801	$0	$721,822,850	2040
Montgomery MUD 8/9 Indirect Reuse	1,120	$0	$12,245,687	2016
NHCRWA Indirect Reuse	16,300	$0	$66,778,694	2040
Wastewater Reuse for Industry	67,200	$332,051,761	$0	2060
Wastewater Reclamation for Mun. Irrigation	36,388	$0	$48,043,249	2030
Permit Strategies:				
BRA System Operations Permit	25,400	TBD	See Contracts	2020
Houston Bayous Permit*	0	$20,956,000	$0	2020
Other Strategies:				
Brazoria Co. Interruptible Supplies for Irr.	104,977	$0	$0	2010
Freeport Desalination Plant	33,600	$255,699,000	See Contracts	2050
Brazos Saltwater Barrier	N/A	$44,470,739	$0	2030

1. WUG-level costs for a number of WMS are indicated as “See Contracts”. The WUG-level costs for these strategies will be infrastructure costs associated with implementing *future* contracts from WWPs. For simplification, these costs are collectively represented under the “WUG-Level Contracts” WMS, as common infrastructure from a WUG may treat or transmit water from multiple WMS.
2. Yield value includes surface water transmission volume and is therefore not additional yield.
3. Includes supply volume of TRA to SJRA Contract
4. The Houston Bayous Permit has not yet been approved by TCEQ.

4.4.4 Alternative Water Management Strategies

Although all of the recommended WMSs are feasible, it is not a certainty that all will be implemented, and those that are implemented may be of a different capacity or on a different schedule than that reflected in this plan. Several alternative WMS are available to Region H, either through increasing the capacity of recommended strategies or by total replacement with another WMS. Alternative WMSs are potentially feasible strategies that should receive first consideration if additional supply is needed for any reason, including the unavailability of the recommended WMS or additional needs beyond the projected shortage. These alternative WMSs are summarized in *Table 4-5* and described below. Alternative WMSs are also included in the screening and environmental impacts tables (4A-3 and 4A-4) in Appendix 4A and are described in technical memoranda in Appendix 4B.

Table 4-5
Alternative WMS Available to Region H

Strategy	WUG(s)	County	Basin	Yield ac-ft/yr	Could Replace
Montgomery MUD 8/9 Desal	MUN, MFR	Montgomery	San Jacinto	2,240	Portion of Surface Water Conversion
Sabine to Region H Transfer	All	Brazoria, Fort Bend, Galveston, Jasper	San Jacinto, San Jacinto-Brazos, Brazos, Brazos-Colorado	486,500	One or more WMS in the lower Brazos Basin
Little River Off-Channel Res.	All	Brazoria, Fort Bend	San Jacinto-Brazos, Brazos, Brazos-Colorado	27,225	Portion of WMS in the lower Brazos Basin

Montgomery MUDs 8 and 9 are currently investigating desalination of brackish groundwater as an alternative WMS for their future needs. Indirect reuse is the recommended initial strategy for these WUGs, and participation with the San Jacinto River Authority in their groundwater reduction plan for Montgomery County is counted in this plan for additional supply. However, brackish desalination was selected as an acceptable alternative WMS in the event that these WUGs decide that it is feasible to incorporate it into their future plans. Montgomery MUDs 8&9 also are pursuing other alternatives to participation in the San Jacinto River Authority groundwater reduction plan, whether or not brackish desalination is implemented.

Two major projects were also selected as alternative WMSs. The largest is the Sabine to Region H transfer which could replace a number of projects in the lower Brazos basin if necessary. This strategy would require considerable infrastructure development including large river diversion pumping stations, canals, and pipelines to divert existing supplies currently unused in the Sabine and Neches River Basins within existing reservoirs. Contracts for use of these supplies would require negotiation between multiple parties, additional permitting for interbasin transfers, and use of some existing infrastructure to allow phasing of the development of the required conveyance infrastructure. This WMS has the advantage of using existing supplies, but requires significant investment for new infrastructure and has a large annual cost for energy and operation of the required facilities.

The development of the Little River Off-Channel Reservoir within the Brazos Basin could serve as an alternative to a portion of one or more projects in the lower Brazos basin. The Little River Off-Channel Reservoir alternative requires significant advance planning and permitting, and cannot be implemented as quickly as the system operation WMS.

4.4.5 Alternative Strategies for Increased Fort Bend County Population

As noted in the Region H resolution presented in Appendix 2B of Chapter 2 of this RWP, the Regional Planning Group has expressed concern over the TWDB methodology adopted for population projections as applied to Fort Bend County. The Group expresses its appreciation to the TWDB for recognizing that the region is seeing increased demands for water and has experienced significant population growth at a rate greater than expected in the approved 2006 Region H Plan. The Group believes that population for the County will exceed the TWDB projected values; however, the nature of the deadlines for RWP development precluded challenging these projections.

The TWDB utilized Method 2 (Revised Slope Projections) for development of the Fort Bend County population projection. The Region H Group recommends the use of Method 3 (Compounding Growth). Decadal population values for both methods are shown in Table 4-6 below.

Table 4-6
Fort Bend County Population Projection Methodology

Method	2010	2020	2030	2040	2050	2060
Method 2 Population	545,883	702,441	893,875	1,090,710	1,348,851	1,643,825
Method 3 Population	553,056	711,671	905,621	1,105,041	1,366,575	1,665,424
Difference in Pop.	7,173	9,230	11,745	14,332	17,724	21,599
Additional Demand (ac-ft/yr)	1,459	1,895	2,309	2,758	3,320	3,966

A per-capita demand was determined by dividing adopted municipal demands by adopted Method 2 population, this value decreased from 0.2 acre-feet per capita per year in 2010 to 0.18 acre-feet per capita per year in 2060 due to TWDB conservation. These per-capita demands were then multiplied by the difference in population between the two methods to determine the estimated additional demand associated with Method 3. The additional demand resulting from Method 3 ranged from 1,459 acre-feet in 2010 to 3,966 acre-feet in 2060. Many of the municipal WUGs in Fort Bend County are shown to have substantial surplus availability through the planning period especially in earlier decades (approximately 40,000 acre-feet per year in 2010). Subsequent to 2010, there is also additional water available from major WMS, including remaining Allens Creek Reservoir yield from 2020 through 2040.. The BRA System Operations permit is estimated to be available in order to meet conversions in Fort Bend County beginning in 2015. As such, existing supplies and proposed WMS should adequately meet Fort Bend County demands for either Method 2 or Method 3 population projections.

4.4.6 Conveyance and Contract Strategies

Several of the recommended strategies do not increase yield or develop new supplies for future use, but rather are included in the recommended plan as necessary for implementation of other strategies or to establish the right to use existing supplies where the demand is creating the shortage. These strategies consist primarily of contractual agreements between WWPs, contractual agreements between WWPs and WUGs, and transmission and treatment infrastructure. For previous RWPs, supplies of water and costs associated with producing those new supplies were in many cases allocated directly at the WUG level even though the anticipated ownership and operation was expected to be provided by WWPs. For the 2011 RWP, costs for infrastructure are now reflected at the WWP level for major infrastructure projects sponsored by the WWP (transmission lines, large-scale treatment, etc), while costs for WUG-level strategies only are shown for individual WUGs. Contract and conveyance strategies do not produce additional yield; volumes of water shown associated with contract or conveyance strategies are generated by another WMS.

4.4.7 Future Water Management Strategies

As in the 2006 RWP, some of the strategies considered were not recommended for inclusion in this plan, but should be reconsidered in future plans as the population and water demands of Region H increase in future decades. These future strategies include both new and existing water sources.

The transfer of existing supplies from East Texas currently remains a potential source of water for Region H. Toledo Bend and Sam Rayburn reservoirs have significant amounts of water which are not currently contracted to other entities, and the cost and impacts of transferring this supply compares favorably against the cost and impacts of developing other future supplies, especially of this large magnitude. Other regions within the state are also evaluating these same available supplies for inclusion in their RWPs, including primarily the Dallas Fort Worth Metroplex area, which did include some future supply from this area in their 2006 RWP.

A substantial portion of projected needs shown in the 2011 Regional Water Plan occur in the Brazos River Basin and adjoining San Jacinto-Brazos Coastal Basin. At the same time, the Brazos River Basin has limited potential for development of new supplies such as large-scale reuse, which could meet a significant proportion of projected needs in the San Jacinto Basin. The Regional Water Planning Group considered the possibility of the above transfer of supplies from East Texas as a possible solution to meet needs in the lower Brazos Basin, but concluded that the most appropriate solution would be development of new in-basin supplies. Pursuant to this, there is a need to increase in-basin surface water supplies by developing storage to convert a portion of the interruptible supply in the lower Brazos to firm supply. The recommended solution for the 2011 RWP includes the development of multiple off-channel reservoirs (OCRs), including the Brazoria County, Fort Bend County, Dow, and GCWA OCRs. These water management strategies, while potentially able to meet shortages, have received only preliminary study; these potential WMS, along with the Millican Reservoir and other on-channel impoundments, will require further consideration and study in future planning cycles.

4.5 Strategy Allocation

Water management strategies were allocated on a county by county basis. The Conservation strategies and Expanded Use of Groundwater were allocated directly to WUGs prior to the selection of new supply strategies, as shown in *Table 4-2*. New supply strategies were associated with the sponsoring WWP as discussed in the technical memoranda, and then allocated to individual WUGs. The details of these allocations are shown on Table 4A-7. Contracts from WWPs to WUGs which would be necessary to transfer WMS supplies from source to user are shown in Table 4A-8 in Appendix 4A.

Shortages were met through a series of steps linking supply and demand through a potential chain of suppliers and infrastructure. WUGs with shortages were assigned a WWP where appropriate, based on existing and proposed infrastructure and service areas. In some cases, WWPs assigned to a WUG were met by higher level WWPs. Major water management strategies were associated with a higher level WWP sponsor, and the available supply associated with the strategy was attributed to the WWP in order to properly allocate down its supply chain to meet the needs of WUGs through new contracts.

Infrastructure costs were estimated for all of the potential and selected WMS, using the cost estimating methods detailed in Appendix 4C. WWP-level costs, typically for reservoir or large-scale regional infrastructure development, are shown in Table 4C-1. WUG level costs for reuse, additional groundwater pumping capacity, and surface water-receiving infrastructure are included in Table 4C-2. Please see the respective technical memoranda in Appendix 4B for explanation of the costs associated with each management strategy.

4.6 Impacts of the 2006 State Water Plan on Galveston Bay Inflows

Efforts in the 1st biennium of planning for the 2011 RWP included analysis of impacts of 2006 SWP strategies on Galveston bay and estuary (B&E) inflows as well as instream flows. The 1st biennium *Environmental Flows Study* examined B&E and instream flow effects of WMS modeled individually, as well as together, for a projected year 2060 condition. The study found that impacts of individual strategies on B&E flow were minor with the exception of large volumes of water moved by interbasin transfers (IBT). Predominant observed changes in instream flow were from increased flows due to IBTs and increased return flows from groundwater-based effluent, although reservoir and system operations did reduce flow at some locations.

Due to the complex interactions among strategies in the 1st biennium study, it was anticipated that WMS may result in varied impacts on B&E flows throughout the planning horizon. This is especially of concern due to timing of certain strategies (reuse and IBTs) occurring in different decades. The end result could be a worst-case scenario for B&E flows sooner than 2060. In order to study this possibility, additional modeling of 2006 recommended WMSs was carried out using decadal models rather than a Year 2060 condition.

Water usage as a result of demand (not allocation) from each Region H WUG was linked to each supply source and water right, including future Region G management strategies. This anticipated water usage was used to create a future condition for the years 2010, 2020, 2030, 2040, 2050, and 2060 for each basin from the TWDB Run 8 models. Trinity River Basin models, including upstream Region C demands and strategies, were received from TWDB and the appropriate diversions and return flows for each WMS were added to the models; Region G water management strategies were not modeled or studied. Where possible, reservoir storage was adjusted over time to account for sedimentation. Model results indicated that the greatest levels of median B&E inflow occur in 2010, and median flows decline through 2040 before beginning to increase again. This pattern is driven primarily by reduced return flows due to upstream reuse in Region C. Results of decadal modeling are discussed in greater detail in Appendix 4D. Additional modeling assessment was performed for a number of the new WMS not recommended in the 2006 RWP. The impacts of new individual WMS as detailed in the 2011 Region H RWP are not anticipated to create major impacts to B&E flows, nor to substantially reduce low (10th percentile) flows at critical stream segments. Whether these strategies would have an additive effect when implemented together is unknown; based on the results of the 1st biennium Environmental Flows Study, it is possible that greater impacts would be realized with when the projects are operating simultaneously. More study would be required to determine if this is the case for new WMS. Model results are discussed in greater detail in Appendix 4E.

4.7 Socio-Economic Impacts of Not Meeting Demands

Region H was able to address every projected water need through a combination of conservation, allocation of existing supply and development of new water supplies. However, the regional planning guidelines in 31 TAC 357 require that the social and economic impacts of not meeting demands be estimated and considered. The TWDB Water Use and Projection Section has performed social and economic impacts modeling for Region H at the request of the Regional Water Planning Group. Model analyses examined the potential impacts of failures to meet projected shortages as identified by the Group. Point estimates were made for 1-year drought at 10-year intervals. Multiple impacts of unmet needs were examined, including the repercussions to sales, income, and tax revenue for the Region, as well changes to population, school enrollment, and jobs. Study results indicate income losses of approximately $3.2 billion in 2010 and $18.2 billion in 2060 if needs are unmet during a 1-year drought period. Lost tax revenues for unmet needs are estimated as $326 million in 2010 and over $2 billion in 2060 (Figure 4-3). Failure to meet needs during drought conditions is projected by the study to result in the loss of jobs, population, and school enrollment. A more description of the impact, model assumptions, and tabulated model results is presented in Appendix 4F.

Figure 4-3
Projected Income Impacts of Unmet needs During Drought Conditions

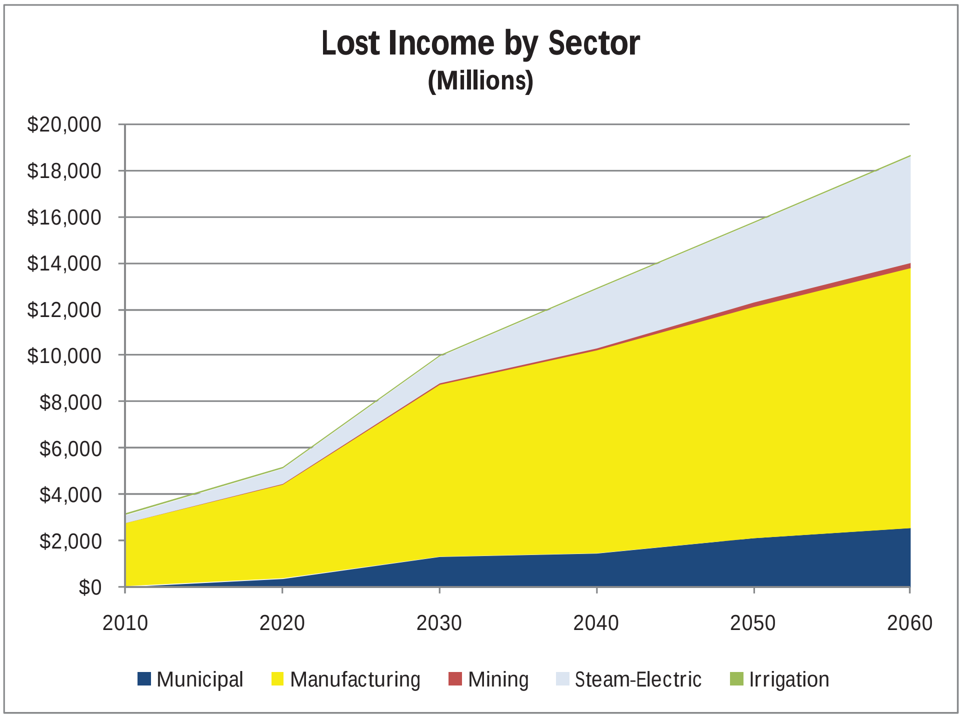


Figure 4-4
Projected Tax Impacts of Unmet needs During Drought Conditions

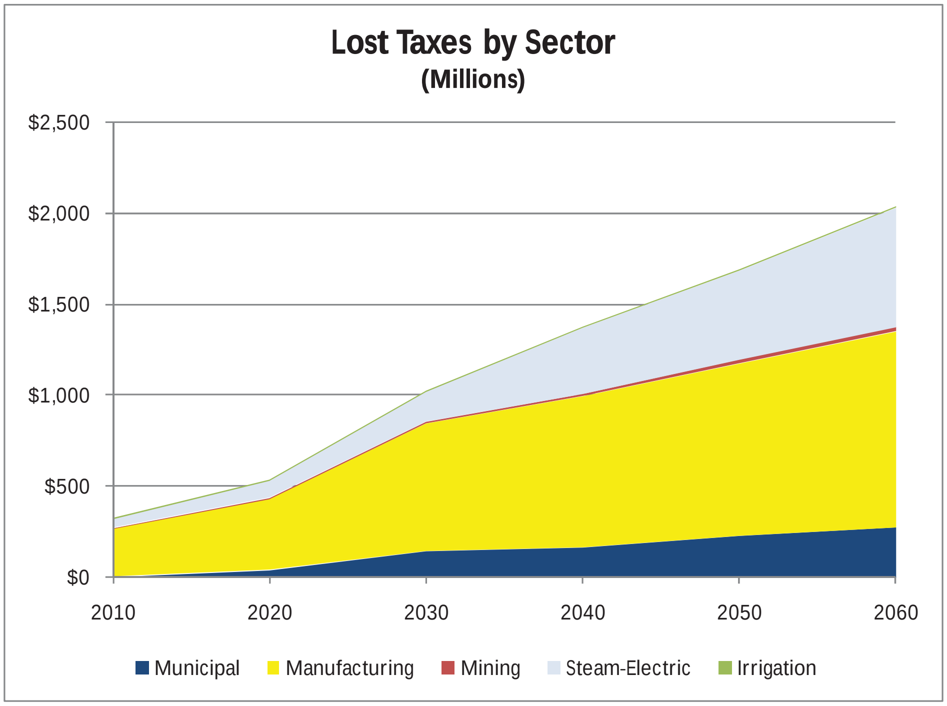
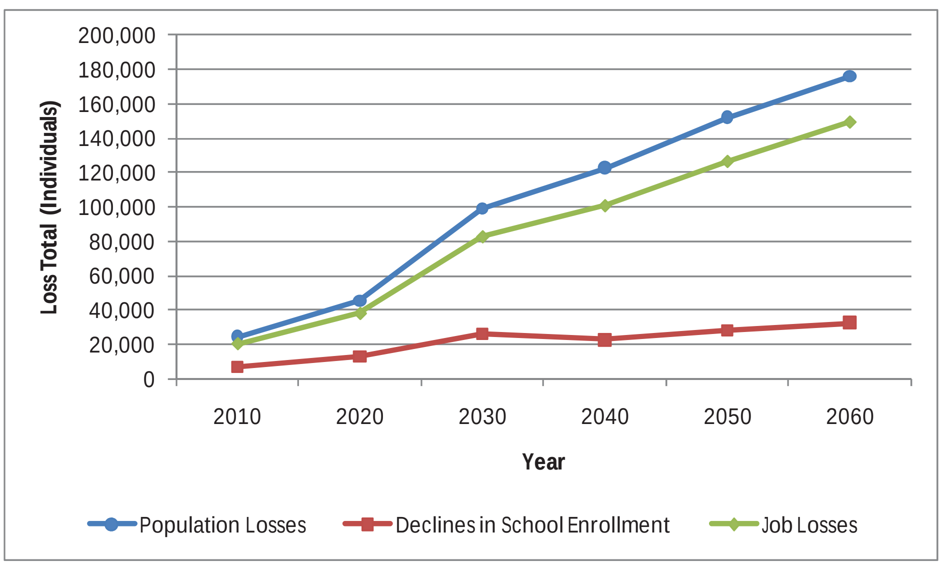


Figure 4-5
Projected Social Impacts of Unmet needs During Drought Conditions



Appendix 4A

Water Management Strategy Tables

This Page Intentionally
Left Blank

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
BELLVILLE	BRAZOS	AUSTIN	080048000	08004800000812	MUN	0	-285	-472	-568	-618	-697
COUNTY-OTHER	BRAZOS	AUSTIN	080757008	08075700800812	MUN	0	0	0	0	0	0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	MUN	0	-26	-45	-53	-57	-66
COUNTY-OTHER	COLORADO	AUSTIN	080757008	08075700800814	MUN	0	-3	-5	-5	-6	-7
IRRIGATION	BRAZOS	AUSTIN	081004008	08100400800812	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	081004008	08100400800813	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	AUSTIN	081005008	08100500800812	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	081005008	08100500800813	IRR	0	0	0	0	0	0
LIVESTOCK	COLORADO	AUSTIN	081005008	08100500800814	IRR	0	0	0	0	0	0
MANUFACTURING	BRAZOS	AUSTIN	081001008	08100100800812	MFR	0	-19	-36	-51	-64	-85
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	081001008	08100100800813	MFR	0	-4	-7	-11	-14	-18
MINING	BRAZOS	AUSTIN	081003008	08100300800812	MIN	0	-4	-7	-9	-11	-13
MINING	BRAZOS-COLORADO	AUSTIN	081003008	08100300800813	MIN	0	0	0	0	-1	-1
MINING	COLORADO	AUSTIN	081003008	08100300800814	MIN	0	-1	-1	-2	-2	-2
SAN FELIPE	BRAZOS	AUSTIN	080954000	08095400000812	MUN	0	-21	-35	-43	-46	-52
SEALY	BRAZOS	AUSTIN	080549000	08054900000812	MUN	0	-360	-608	-725	-785	-888
WALLIS	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	MUN	0	-16	-24	-29	-31	-36
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	MUN	0	-170	-317	-434	-620	-847
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	MUN	-278	-285	-303	-309	-367	-454
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	080817000	08081700002011	MUN	0	-3	-5	-7	-10	-15
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	080817000	08081700002012	MUN	0	0	0	-1	-2	-2
BRAZORIA	BRAZOS	BRAZORIA	080072000	08007200002012	MUN	8	9	10	12	12	11
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	080072000	08007200002013	MUN	25	28	32	39	38	34
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	MUN	0	-372	-745	-1069	-1429	-1806
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	084031000	08403100002012	MUN	0	-475	-935	-1347	-1794	-2261
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	MUN	0	-269	-536	-769	-1028	-1299
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	084033000	08403300002011	MUN	0	0	0	0	0	0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	084034000	08403400002011	MUN	0	0	0	0	0	0
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	MUN	0	-30	-57	-82	-112	-147
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	MUN	-34	-67	-118	-144	-202	-278
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	MUN	-5289	-6254	-7449	-8446	-9623	-10931
COUNTY-OTHER	BRAZOS	BRAZORIA	080757020	08075702002012	MUN	-7	-123	-132	-138	-147	-157
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	MUN	-1987	-2242	-2499	-2705	-2968	-3267
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	MUN	0	-11	-20	-27	-39	-54
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	MUN	11	-270	-563	-819	-1112	-1449
FREEPORT	BRAZOS	BRAZORIA	080217000	08021700002012	MUN	1	-18	-31	-40	-49	-57
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	MUN	0	-1	-1	-2	-5	-8
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	MUN	0	0	0	0	0	-2
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	MUN	0	-10	-18	-27	-37	-48
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	IRR	-100180	-89120	-84878	-82321	-82321	-82321
IRRIGATION	BRAZOS	BRAZORIA	081004020	08100402002012	IRR	-2336	-1966	-1825	-1739	-1739	-1739
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	081004020	08100402002013	IRR	-771	-771	-771	-771	-771	-771
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	080308000	08030800002013	MUN	0	0	0	0	0	0
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	MUN	-999	-1316	-1595	-1867	-2194	-2579
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	IRR	0	-40	0	0	0	0
LIVESTOCK	BRAZOS	BRAZORIA	081005020	08100502002012	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	081005020	08100502002013	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	MFR	3029	-1241	-5020	-8833	-12180	-16280
MANUFACTURING	BRAZOS	BRAZORIA	081001020	08100102002012	MFR	-38936	-80493	-100362	-120378	-138163	-159612
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	081001020	08100102002013	MFR	10170	10118	10012	9905	9811	9696
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	MUN	0	-102	-99	-96	-94	-94
MINING	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	MIN	0	-108	-162	-216	-269	-319
MINING	BRAZOS	BRAZORIA	081003020	08100302002012	MIN	0	-119	-136	-154	-171	-187
MINING	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	MIN	0	-564	-728	-888	-1050	-1202
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	MUN	0	-8	-16	-24	-32	-41
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	MUN	0	-65	-128	-189	-252	-326
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	MUN	-34	-56	-78	-97	-119	-145
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	MUN	3687	771	-1792	-4223	-6943	-9777
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	MUN	-56	-69	-78	-85	-101	-123
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	MUN	0	-2	-4	-6	-8	-12
SURFSIDE BEACH	BRAZOS	BRAZORIA	080967000	08096700002012	MUN	0	-21	-41	-60	-80	-103
SWEENY	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	MUN	0	-30	-57	-78	-111	-151

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
VARNER CREEK UD	BRAZOS	BRAZORIA	084370000	08437000002012	MUN	0	-69	-135	-197	-263	-335
WEST COLUMBIA	BRAZOS	BRAZORIA	080640000	08064000002012	MUN	0	0	0	0	0	0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	080640000	08064000002013	MUN	0	0	0	0	0	0
ANAHUAC	NECHES-TRINITY	CHAMBERS	080015000	08001500003607	MUN	584	566	550	539	522	504
ANAHUAC	TRINITY	CHAMBERS	080015000	08001500003608	MUN	168	163	159	156	152	146
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	MUN	272	287	295	301	295	282
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	MUN	-193	-280	-357	-425	-498	-572
BEACH CITY	TRINITY	CHAMBERS	080822000	08082200003608	MUN	-32	-44	-55	-65	-75	-86
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	080757036	08075703603607	MUN	-3	-3	-3	-2	-2	-2
COUNTY-OTHER	TRINITY	CHAMBERS	080757036	08075703603608	MUN	-207	-200	-193	-185	-180	-178
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	MUN	-113	-110	-108	-107	-105	-106
IRRIGATION	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	IRR	37189	36917	36731	36530	36298	36026
IRRIGATION	TRINITY	CHAMBERS	081004036	08100403603608	IRR	-27053	-27277	-27411	-27534	-27652	-27753
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	IRR	948	927	890	857	827	797
LIVESTOCK	NECHES-TRINITY	CHAMBERS	081005036	08100503603607	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	CHAMBERS	081005036	08100503603608	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	081005036	08100503603609	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	MFR	-8264	-9421	-10449	-11473	-12394	-13584
MINING	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	MIN	-104	-157	-190	-221	-253	-281
MINING	TRINITY	CHAMBERS	081003036	08100303603608	MIN	-4344	-6691	-8121	-9524	-10915	-12131
MINING	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	MIN	-1260	-1970	-2402	-2927	-3490	-4056
MONT BELVIEU	TRINITY	CHAMBERS	080413000	08041300003608	MUN	-553	-754	-939	-1099	-1266	-1437
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	MUN	-220	-314	-400	-476	-554	-634
OLD RIVER-WINFREE	TRINITY	CHAMBERS	080727000	08072700003608	MUN	-174	-191	-203	-213	-228	-245
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	081002036	08100203603609	PWR	26895	27482	26970	26345	25581	24634
TRINITY BAY CONSERVATION DISTRI	NECHES-TRINITY	CHAMBERS	084362000	08436200003607	MUN	1536	1319	1134	983	844	690
TRINITY BAY CONSERVATION DISTRI	TRINITY	CHAMBERS	084362000	08436200003608	MUN	702	604	517	449	386	316
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	MUN	0	-130	-284	-324	-376	-432
BEASLEY	BRAZOS	FORT BEND	081012000	08101200007912	MUN	0	-1	-2	-4	-6	-8
BEASLEY	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	MUN	0	-11	-24	-38	-58	-82
COUNTY-OTHER	SAN JACINTO	FORT BEND	080757079	08075707907910	MUN	0	-28	-70	-571	-1867	-3339
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	MUN	73	-66	-150	-3888	-12148	-21323
COUNTY-OTHER	BRAZOS	FORT BEND	080757079	08075707907912	MUN	0	-331	-2913	-7713	-17306	-28713
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	080757079	08075707907913	MUN	0	0	0	0	0	0
FAIRCHILDS	BRAZOS	FORT BEND	081019000	08101900007912	MUN	0	-154	-390	-527	-711	-922
FIRST COLONY MUD #9	BRAZOS	FORT BEND	084113000	08411300007912	MUN	0	-427	-880	-921	-972	-1022
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	084117000	08411700007912	MUN	0	-288	-576	-574	-574	-574
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	084118000	08411800007912	MUN	0	-173	-344	-343	-343	-343
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	084119000	08411900007912	MUN	0	-232	-463	-461	-461	-461
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MUN	0	-605	-1210	-1210	-1211	-1211
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	MUN	0	-667	-1805	-2599	-3673	-4900
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	084126000	08412600007912	MUN	0	-246	-490	-488	-488	-488
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	084127000	08412700007912	MUN	0	-180	-360	-360	-360	-360
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	084128000	08412800007912	MUN	0	-144	-286	-286	-286	-286
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	084129000	08412900007912	MUN	0	-310	-809	-1135	-1568	-2062
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	MUN	0	-52	-131	-176	-235	-306
FULSHEAR	BRAZOS	FORT BEND	080869000	08086900007912	MUN	0	-80	-201	-270	-362	-469
HOUSTON	SAN JACINTO	FORT BEND	080285000	08028500007910	MUN	0	0	0	0	0	-527
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	080285000	08028500007911	MUN	0	0	0	0	0	-370
IRRIGATION	SAN JACINTO	FORT BEND	081004079	08100407907910	IRR	0	0	0	0	0	0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	081004079	08100407907911	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS	FORT BEND	081004079	08100407907912	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS-COLORADO	FORT BEND	081004079	08100407907913	IRR	0	0	0	0	0	0
KATY	SAN JACINTO	FORT BEND	080312000	08031200007910	MUN	-86	-262	-387	-500	-648	-822
LIVESTOCK	SAN JACINTO	FORT BEND	081005079	08100507907910	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	081005079	08100507907911	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	FORT BEND	081005079	08100507907912	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	081005079	08100507907913	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	FORT BEND	081001079	08100107907910	MFR	0	-623	-1292	-1354	-1396	-1282
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	MFR	1000	-148	-1382	-1498	-1574	-1351
MANUFACTURING	BRAZOS	FORT BEND	081001079	08100107907912	MFR	400	11	-406	-445	-471	-396
MEADOWS	SAN JACINTO	FORT BEND	080792000	08079200007910	MUN	0	-558	-1103	-1090	-1085	-1085

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	MUN	0	-55	-110	-109	-108	-108
MINING	SAN JACINTO	FORT BEND	081003079	08100307907910	MIN	0	-77	-165	-168	-171	-173
MINING	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	MIN	0	-86	-703	-717	-729	-739
MINING	BRAZOS	FORT BEND	081003079	08100307907912	MIN	0	-189	-383	-389	-396	-401
MINING	BRAZOS-COLORADO	FORT BEND	081003079	08100307907913	MIN	0	-4	-4	-6	-7	-9
MISSOURI CITY	SAN JACINTO	FORT BEND	080409000	08040900007910	MUN	1559	606	-722	-1362	-1843	-2898
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MUN	6944	2633	-3379	-6272	-8447	-13226
MISSOURI CITY	BRAZOS	FORT BEND	080409000	08040900007912	MUN	210	94	-68	-146	-204	-333
NEEDVILLE	BRAZOS	FORT BEND	080428000	08042800007912	MUN	0	-43	-97	-152	-229	-320
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	MUN	0	-53	-118	-185	-277	-387
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	MUN	0	-5	-11	-13	-15	-18
PECAN GROVE MUD #1	BRAZOS	FORT BEND	084299000	08429900007912	MUN	2450	1754	1047	1018	945	847
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	MUN	651	466	278	271	251	225
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	MUN	0	-166	-326	-320	-318	-318
PLEAK	BRAZOS	FORT BEND	081053000	08105300007912	MUN	0	-99	-223	-348	-516	-709
RICHMOND	BRAZOS	FORT BEND	080500000	08050000007912	MUN	3000	2303	1342	917	191	-611
ROSENBERG	BRAZOS	FORT BEND	080518000	08051800007912	MUN	4500	2579	-259	-1829	-3964	-6498
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MUN	0	-364	-727	-723	-723	-723
SIMONTON	BRAZOS	FORT BEND	081062000	08106200007912	MUN	0	-78	-173	-270	-397	-548
STAFFORD	SAN JACINTO	FORT BEND	080577000	08057700007910	MUN	1155	1047	849	727	554	356
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	080577000	08057700007911	MUN	4838	4393	3563	3051	2323	1491
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	081002079	08100207907912	PWR	57001	54981	43474	29445	12345	-8500
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	MUN	6972	2932	-1316	-1276	-1276	-2176
SUGAR LAND	BRAZOS	FORT BEND	080585000	08058500007912	MUN	5082	2124	-985	-956	-956	-956
SUGAR LAND	SAN JACINTO	FORT BEND	080585000	08058500007910	MUN	509	213	-99	-96	-96	-96
WHCRWA	SAN JACINTO	FORT BEND	088002000	08800200007910	MUN	1238	-190	-1686	-2269	-2813	-3345
NFBWA	BRAZOS	FORT BEND	NFBWA	NFBWA07912	MUN	0	16	-942	-1960	-3472	-5383
NFBWA	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	MUN	0	2033	-9386	-13549	-15261	-15807
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	MUN	0	-4242	-14668	-24317	-32959	-41144
KENDLETON	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	MUN	0	-43	-100	-173	-267	-388
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	MUN	821	801	804	813	816	811
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	080759000	08075900008411	MUN	133	104	91	87	84	80
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	084027000	08402700008407	MUN	4426	4298	4209	4148	4088	4027
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	MUN	-99	-104	-106	-104	-104	-106
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	080757084	08075708408407	MUN	1	1	0	1	1	0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	MUN	17764	17899	17987	18037	18064	18078
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	MUN	-685	-1016	-1186	-1220	-1257	-1299
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	080219000	08021900008411	MUN	2179	2024	1972	2012	2002	1974
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	MUN	9732	9904	10077	10251	10366	10366
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	084135000	08413500008411	MUN	146	164	177	185	193	194
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	MUN	559	530	514	510	506	502
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	MUN	891	889	894	908	911	908
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	IRR	-9180	-9180	-9180	-9180	-9180	-9180
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	080886000	08088600008411	MUN	102	116	125	133	138	139
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	MUN	-186	-230	-256	-264	-268	-274
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	080342000	08034200008411	MUN	1262	1304	1345	1386	1414	1414
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	MUN	-3309	-4085	-4506	-4583	-4672	-4779
LIVESTOCK	NECHES-TRINITY	GALVESTON	081005084	08100508408407	IRR	-14	-14	-14	-14	-14	-14
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	081005084	08100508408411	IRR	0	-10	-26	-26	-26	-25
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	081001084	08100108408411	MFR	31510	28185	25469	22823	20548	17024
MINING	NECHES-TRINITY	GALVESTON	081003084	08100308408407	MIN	-16	-23	-27	-30	-34	-38
MINING	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	MIN	-15	-22	-25	-29	-32	-35
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	MUN	1490	1452	1442	1446	1445	1438
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	080743000	08074300008411	MUN	265	263	270	294	298	294
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	PWR	-2803	-1782	-2461	-3288	-4297	-5526
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	MUN	6209	6292	6395	6513	6591	6587
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	MUN	196	157	136	128	123	118
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	MUN	4790	4717	4600	4510	4272	3958
BAYTOWN	SAN JACINTO	HARRIS	080042000	08004200010110	MUN	283	279	272	267	253	234
BELLAIRE	SAN JACINTO	HARRIS	080046000	08004600010110	MUN	-1677	-1936	-2197	-2470	-2760	-3074
BLUE BELL MANOR UTILITY COMPAN	SAN JACINTO	HARRIS	084026000	08402600010110	MUN	-172	-394	-444	-437	-432	-432
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	084036000	08403600010110	MUN	-141	-385	-501	-580	-658	-739

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	080085000	08008500010110	MUN	-568	-558	-548	-538	-535	-535
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	084043000	08404300010110	MUN	-135	-371	-488	-569	-648	-731
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	084053000	08405300010110	MUN	226	-26	-74	-68	-63	-63
CLEAR BROOK CITY MUD WOODMEA	SAN JACINTO	HARRIS	084063000	08406300010110	MUN	877	791	691	599	496	377
CONSUMERS WATER INC	SAN JACINTO	HARRIS	084072000	08407200010110	MUN	-120	-367	-522	-636	-766	-895
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	080757101	08075710110109	MUN	934	1411	1234	1861	2262	2586
COUNTY-OTHER	SAN JACINTO	HARRIS	080757101	08075710110110	MUN	3936	1565	-6122	-25351	-51644	-79434
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	MUN	-203	258	-116	270	321	282
CROSBY MUD	SAN JACINTO	HARRIS	084078000	08407800010110	MUN	332	265	201	138	72	-8
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	084081000	08408100010110	MUN	-6	-19	-26	-32	-38	-44
DEER PARK	SAN JACINTO	HARRIS	080154000	08015400010110	MUN	18	9	20	12	-23	-70
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	MUN	10	13	-29	-44	-99	-179
EL DORADO UD	SAN JACINTO	HARRIS	084101000	08410100010110	MUN	-139	-355	-435	-475	-518	-566
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	MUN	-278	-299	-311	-319	-326	-337
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	084132000	08413200010110	MUN	-102	-272	-350	-395	-444	-497
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	080219000	08021900010111	MUN	795	684	637	638	628	615
GALENA PARK	SAN JACINTO	HARRIS	080226000	08022600010110	MUN	-100	-103	-114	-121	-154	-201
GREEN TRAILS MUD	SAN JACINTO	HARRIS	084143000	08414300010110	MUN	-275	-725	-926	-1044	-1164	-1288
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	084149000	08414900010110	MUN	-50	-38	-27	-16	-8	-8
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	084150000	08415000010110	MUN	-490	-439	-422	-380	-380	-380
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	084151000	08415100010110	MUN	-124	-174	-219	-272	-322	-379
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	084153000	08415300010110	MUN	-125	-329	-418	-469	-522	-581
HARRIS COUNTY MUD #119 INWOOD	SAN JACINTO	HARRIS	084154000	08415400010110	MUN	-263	-643	-719	-704	-696	-696
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	084157000	08415700010110	MUN	-526	-1523	-2063	-2470	-2869	-3285
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	084159000	08415900010110	MUN	-382	-887	-1007	-1000	-1000	-1000
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	084160000	08416000010110	MUN	-236	-710	-982	-1198	-1424	-1649
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	084161000	08416100010110	MUN	-368	-1168	-1685	-2112	-2550	-2985
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	084162000	08416200010110	MUN	-203	-581	-779	-927	-1070	-1226
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	084165000	08416500010110	MUN	265	-7	-60	-48	-48	-48
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	084170000	08417000010110	MUN	-185	-519	-691	-817	-940	-1072
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	084174000	08417400010110	MUN	-241	-679	-906	-1072	-1235	-1409
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	084179000	08417900010110	MUN	-188	-543	-629	-627	-627	-627
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	084182000	08418200010110	MUN	-425	-982	-1122	-1118	-1118	-1118
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	084183000	08418300010110	MUN	-251	-575	-646	-641	-641	-641
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	084184000	08418400010110	MUN	-196	-449	-502	-491	-484	-484
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	084185000	08418500010110	MUN	374	102	3	-32	-74	-121
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	084186000	08418600010110	MUN	-710	-1161	-1583	-2015	-2435	-2888
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	084187000	08418700010111	MUN	3426	2853	2738	2777	2803	2803
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	084189000	08418900010110	MUN	-138	-197	-250	-307	-370	-442
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	084190000	08419000010110	MUN	-175	-444	-549	-600	-653	-708
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	084191000	08419100010110	MUN	-128	-339	-433	-488	-545	-608
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	084193000	08419300010110	MUN	450	-101	-346	-487	-637	-803
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	084195000	08419500010110	MUN	-226	-525	-598	-590	-594	-594
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	084196000	08419600010110	MUN	-362	-411	-454	-492	-554	-629
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	084197000	08419700010110	MUN	-275	-387	-476	-579	-692	-820
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	084198000	08419800010110	MUN	-544	-602	-654	-709	-769	-836
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	084199000	08419900010110	MUN	-89	-203	-227	-222	-219	-219
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	084200000	08420000010110	MUN	-232	-234	-236	-234	-241	-251
HEDWIG VILLAGE	SAN JACINTO	HARRIS	080269000	08026900010110	MUN	-504	-505	-506	-507	-510	-516
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	081025000	08102500010110	MUN	60	-15	-31	-29	-29	-29
HOUSTON	SAN JACINTO	HARRIS	080285000	08028500010110	MUN	0	-7398	-12460	-12460	-12460	-46805
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	MUN	0	-207	-339	-339	-339	-2253
HUMBLE	SAN JACINTO	HARRIS	080289000	08028900010110	MUN	-1052	-2796	-3517	-3918	-4335	-4776
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	080290000	08029000010110	MUN	-1059	-1169	-1276	-1378	-1491	-1612
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	081004101	08100410110109	IRR	1355	1355	1355	1355	1355	1355
IRRIGATION	SAN JACINTO	HARRIS	081004101	08100410110110	IRR	1476	1476	1476	1476	1476	1476
JACINTO CITY	SAN JACINTO	HARRIS	080301000	08030100010110	MUN	79	34	-30	-75	-146	-232
JERSEY VILLAGE	SAN JACINTO	HARRIS	080709000	08070900010110	MUN	364	-476	-896	-1190	-1479	-1782
KATY	SAN JACINTO	HARRIS	080312000	08031200010110	MUN	-959	-2707	-3635	-4321	-4993	-5695
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	080346000	08034600010111	MUN	3658	3323	2944	2615	2218	1773
LA PORTE	SAN JACINTO	HARRIS	080346000	08034600010110	MUN	208	193	167	162	141	118
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	MUN	-17	-17	-17	-17	-18	-18

Region H

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	081005101	08100510110109	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	HARRIS	081005101	08100510110110	IRR	39	0	42	42	42	42
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	081005101	08100510110111	IRR	0	0	0	0	0	0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	084235000	08423500010110	MUN	-179	-600	-890	-1146	-1400	-1653
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	MFR	-23008	-28282	-32767	-36739	-39712	-38220
MANUFACTURING	SAN JACINTO	HARRIS	081001101	08100110110110	MFR	159761	141132	125320	111299	100804	106072
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	MFR	-4487	-9348	-13508	-17178	-19923	-18546
MASON CREEK UD	SAN JACINTO	HARRIS	084247000	08424700010110	MUN	-706	-1625	-1833	-1817	-1809	-1809
MINING	SAN JACINTO	HARRIS	081003101	08100310110110	MIN	-140	-289	-382	-475	-570	-653
MINING	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	MIN	-3	-6	-8	-10	-11	-13
MISSOURI CITY	SAN JACINTO	HARRIS	080409000	08040900010110	MUN	959	454	-181	-450	-696	-1024
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	080424000	08042400010111	MUN	1259	1271	1284	1298	1308	1308
NHCRWA	SAN JACINTO	HARRIS	088000000	08800000010110	MUN	-105	-61118	-87517	-96184	-99696	-103906
NORTH BELT UD	SAN JACINTO	HARRIS	084275000	08427500010110	MUN	-139	-420	-585	-717	-856	-994
NORTH GREEN MUD	SAN JACINTO	HARRIS	084279000	08427900010110	MUN	-105	-265	-324	-347	-373	-402
NORTHWEST HARRIS COUNTY MUD #	SAN JACINTO	HARRIS	084286000	08428600010110	MUN	-176	-510	-698	-830	-977	-1123
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	084287000	08428700010110	MUN	-846	-2396	-2742	-2687	-2661	-2661
PARKWAY UD	SAN JACINTO	HARRIS	084298000	08429800010110	MUN	-242	-237	-230	-224	-220	-222
PASADENA	SAN JACINTO	HARRIS	080456000	08045600010110	MUN	15746	14295	12977	11585	10062	8353
PASADENA	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	MUN	3449	3044	2674	2285	1858	1380
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	MUN	227	129	56	-21	-104	-185
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	084302000	08430200010110	MUN	-271	-340	-402	-469	-542	-624
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	080468000	08046800010110	MUN	-773	-817	-861	-903	-953	-1009
ROLLING FORK PUD	SAN JACINTO	HARRIS	084411000	08441100010110	MUN	-212	-510	-602	-626	-655	-688
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	MUN	-1262	-1678	-2077	-2502	-2923	-3366
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	080558000	08055800010111	MUN	222	209	197	187	189	189
SOUTH HOUSTON	SAN JACINTO	HARRIS	080569000	08056900010110	MUN	2369	2264	2129	2026	1882	1715
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	080572000	08057200010110	MUN	-6	-33	-58	-82	-110	-140
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	084343000	08434300010110	MUN	-213	-556	-706	-786	-874	-971
SPRING VALLEY	SAN JACINTO	HARRIS	080575000	08057500010110	MUN	-266	-640	-755	-783	-819	-860
STAFFORD	SAN JACINTO	HARRIS	080577000	08057700010110	MUN	188	62	47	34	24	16
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	081002101	08100210110110	PWR	7085	-8216	-12036	-16693	-22369	-29287
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	PWR	-400	-1333	-1566	-1849	-2195	-2617
SUNBELT FWSD	SAN JACINTO	HARRIS	084350000	08435000010110	MUN	-861	-3173	-4252	-4993	-5719	-6484
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	080751000	08075100010111	MUN	913	930	946	963	969	969
TOMBALL	SAN JACINTO	HARRIS	080608000	08060800010110	MUN	-786	-2311	-3074	-4066	-4794	-5862
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	084355000	08435500010110	MUN	-424	-963	-1091	-1071	-1071	-1071
WALLER	SAN JACINTO	HARRIS	080629000	08062900010110	MUN	-7	-79	-123	-158	-193	-229
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	080635000	08063500010111	MUN	6835	6155	5480	4820	4142	3466
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	084387000	08438700010110	MUN	-169	-393	-449	-439	-433	-433
WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	080643000	08064300010110	MUN	-428	-602	-765	-918	-1107	-1316
WHCRWA	SAN JACINTO	HARRIS	088002000	08800200010110	MUN	1179	-27927	-39610	-44206	-45691	-46446
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	084398000	08439800010110	MUN	-199	-456	-512	-502	-496	-496
WINDFERN FOREST UD	SAN JACINTO	HARRIS	084401000	08440100010110	MUN	-174	-653	-741	-733	-733	-733
WOODCREEK MUD	SAN JACINTO	HARRIS	084404000	08440400010110	MUN	-187	-570	-799	-984	-1174	-1364
NFBWA	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	MUN	0	-501	-793	-922	-995	-1013
CHCRWA	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	MUN	984	-2128	-2771	-2771	-2771	-2771
BUFFALO	TRINITY	LEON	080083000	08008300014508	MUN	0	-36	-53	-49	-44	-47
CENTERVILLE	TRINITY	LEON	080105000	08010500014508	MUN	0	-14	-21	-18	-16	-17
COUNTY-OTHER	TRINITY	LEON	080757145	08075714514508	MUN	0	-20	-24	-15	-8	-11
COUNTY-OTHER	BRAZOS	LEON	080757145	08075714514512	MUN	0	-21	-26	-17	-10	-13
FLO COMMUNITY WSC	TRINITY	LEON	084114000	08411400014508	MUN	0	-107	-160	-156	-141	-149
IRRIGATION	TRINITY	LEON	081004145	08100414514508	IRR	0	0	0	0	0	0
JEWETT	TRINITY	LEON	080887000	08088700014508	MUN	0	-26	-41	-40	-37	-39
JEWETT	BRAZOS	LEON	080887000	08088700014512	MUN	0	-9	-13	-13	-12	-13
LIVESTOCK	TRINITY	LEON	081005145	08100514514508	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	LEON	081005145	08100514514512	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	LEON	081001145	08100114514508	MFR	0	-128	-253	-379	-493	-599
MINING	TRINITY	LEON	081003145	08100314514508	MIN	0	0	0	0	0	0
MINING	BRAZOS	LEON	081003145	08100314514512	MIN	0	0	0	0	0	0
NORMANGEE	TRINITY	LEON	080927000	08092700014508	MUN	0	-11	-16	-14	-13	-14
NORMANGEE	BRAZOS	LEON	080927000	08092700014512	MUN	0	-4	-7	-6	-5	-6

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
AMES	TRINITY	LIBERTY	080676000	08067600014608	MUN	0	-22	-42	-60	-84	-113
CLEVELAND	SAN JACINTO	LIBERTY	080116000	08011600014610	MUN	0	-24	-51	-75	-123	-188
COUNTY-OTHER	NECHES	LIBERTY	080757146	08075714614606	MUN	0	-25	-49	-74	-101	-134
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	080757146	08075714614607	MUN	0	-1	-3	-5	-7	-9
COUNTY-OTHER	TRINITY	LIBERTY	080757146	08075714614608	MUN	0	-329	-654	-999	-1370	-1841
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	MUN	0	-30	-60	-90	-123	-163
COUNTY-OTHER	SAN JACINTO	LIBERTY	080757146	08075714614610	MUN	0	-210	-413	-624	-851	-1133
DAISETTA	NECHES	LIBERTY	080149000	08014900014606	MUN	0	-1	-2	-3	-4	-7
DAISETTA	TRINITY	LIBERTY	080149000	08014900014608	MUN	0	-2	-3	-4	-7	-11
DAYTON	TRINITY	LIBERTY	080152000	08015200014608	MUN	0	-424	-816	-1187	-1618	-2118
HARDIN	TRINITY	LIBERTY	080878000	08087800014608	MUN	0	-19	-36	-55	-75	-99
HARDIN WSC	TRINITY	LIBERTY	084148000	08414800014608	MUN	0	-102	-200	-298	-406	-532
IRRIGATION	NECHES	LIBERTY	081004146	08100414614606	IRR	-805	-805	-805	-805	-805	-805
IRRIGATION	NECHES-TRINITY	LIBERTY	081004146	08100414614607	IRR	11355	11313	11282	11250	11213	11171
IRRIGATION	TRINITY	LIBERTY	081004146	08100414614608	IRR	1424	-558	-2009	-3599	-5484	-7618
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	IRR	-11041	-11081	-11116	-11151	-11189	-11217
IRRIGATION	SAN JACINTO	LIBERTY	081004146	08100414614610	IRR	0	0	0	0	0	0
KENEFICK	TRINITY	LIBERTY	081033000	08103300014608	MUN	0	-18	-34	-50	-68	-89
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	LIBERTY	084226000	08422600014608	MUN	72	63	56	51	45	35
LIBERTY	TRINITY	LIBERTY	080356000	08035600014608	MUN	0	-18	-23	-34	-69	-119
LIVESTOCK	NECHES	LIBERTY	081005146	08100514614606	IRR	0	0	0	0	0	0
LIVESTOCK	NECHES-TRINITY	LIBERTY	081005146	08100514614607	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	LIBERTY	081005146	08100514614608	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	081005146	08100514614609	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	LIBERTY	081005146	08100514614610	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	LIBERTY	081001146	08100114614608	MFR	0	-12	-23	-35	-46	-55
MANUFACTURING	SAN JACINTO	LIBERTY	081001146	08100114614610	MFR	0	-60	-121	-183	-239	-288
MERCY WSC	SAN JACINTO	LIBERTY	084253000	08425300014610	MUN	0	-13	-25	-38	-51	-67
MINING	NECHES	LIBERTY	081003146	08100314614606	MIN	0	0	0	0	0	-1
MINING	NECHES-TRINITY	LIBERTY	081003146	08100314614607	MIN	0	0	0	-1	0	0
MINING	TRINITY	LIBERTY	081003146	08100314614608	MIN	0	-57	-109	-157	-211	-268
MINING	TRINITY-SAN JACINTO	LIBERTY	081003146	08100314614609	MIN	0	-10	-15	-20	-25	-30
MINING	SAN JACINTO	LIBERTY	081003146	08100314614610	MIN	0	0	0	0	-1	-1
PLUM GROVE	SAN JACINTO	LIBERTY	081054000	08105400014610	MUN	0	-35	-66	-99	-136	-178
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	084343000	08434300014610	MUN	0	-2	-4	-6	-9	-12
STEAM ELECTRIC POWER	TRINITY	LIBERTY	081002146	08100214614608	PWR	0	-1278	-1995	-2869	-3934	-5233
WEST HARDIN WSC	NECHES	LIBERTY	084383000	08438300014606	MUN	0	-6	-13	-18	-25	-34
COUNTY-OTHER	TRINITY	MADISON	080757157	08075715715708	MUN	1	-61	-106	-69	-100	-165
COUNTY-OTHER	BRAZOS	MADISON	080757157	08075715715712	MUN	0	-4	-7	-9	-12	-16
IRRIGATION	TRINITY	MADISON	081004157	08100415715708	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	MADISON	081005157	08100515715708	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	MADISON	081005157	08100515715712	IRR	0	0	0	0	0	0
MADISONVILLE	TRINITY	MADISON	080382000	08038200015708	MUN	0	-34	-56	-75	-100	-127
MANUFACTURING	TRINITY	MADISON	081001157	08100115715708	MFR	0	-29	-56	-83	-107	-138
MINING	TRINITY	MADISON	081003157	08100315715708	MIN	0	0	0	0	0	0
MINING	BRAZOS	MADISON	081003157	08100315715712	MIN	0	0	0	0	0	0
NORMANGEE	TRINITY	MADISON	080927000	08092700015708	MUN	-1	-2	-3	-3	-4	-4
CONROE	SAN JACINTO	MONTGOMERY	080130000	08013000017010	MUN	-2584	-6181	-9761	-10193	-16483	-23761
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	084072000	08407200017010	MUN	-51	-103	-161	-226	-319	-430
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	080757170	08075717017010	MUN	-5261	-11516	-20786	-33264	-50557	-71563
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	084081000	08408100017010	MUN	-139	-299	-495	-743	-1122	-1564
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	080854000	08085400017010	MUN	-48	-99	-150	-149	-236	-338
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	084098000	08409800017010	MUN	-108	-234	-385	-418	-720	-1070
H M W SUD	SAN JACINTO	MONTGOMERY	084147000	08414700017010	MUN	-390	-790	-1200	-1186	-1888	-2692
HOUSTON	SAN JACINTO	MONTGOMERY	080285000	08028500017010	MUN	-12	-75	-197	-338	-526	-748
IRRIGATION	SAN JACINTO	MONTGOMERY	081004170	08100417017010	IRR	865	852	845	840	835	832
LIVESTOCK	SAN JACINTO	MONTGOMERY	081005170	08100517017010	IRR	393	293	239	199	161	132
MAGNOLIA	SAN JACINTO	MONTGOMERY	080907000	08090700017010	MUN	-101	-266	-463	-678	-966	-1308
MANUFACTURING	SAN JACINTO	MONTGOMERY	081001170	08100117017010	MFR	-469	-988	-1384	-1756	-2129	-2504
MINING	SAN JACINTO	MONTGOMERY	081003170	08100317017010	MIN	-110	-216	-279	-331	-382	-425
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	084261000	08426100017010	MUN	-430	-1007	-2080	-2551	-4352	-6446
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	084262000	08426200017010	MUN	-105	-192	-236	-190	-245	-285

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	084263000	08426300017010	MUN	-193	-464	-703	-692	-827	-927
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	084264000	08426400017010	MUN	-182	-461	-757	-743	-912	-1042
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	084265000	08426500017010	MUN	-128	-234	-289	-328	-367	-399
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	084266000	08426600017010	MUN	-111	-214	-297	-270	-401	-544
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	084267000	08426700017010	MUN	-225	-411	-509	-407	-523	-610
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	084268000	08426800017010	MUN	-114	-220	-306	-397	-515	-653
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	084272000	08427200017010	MUN	-335	-699	-1144	-1648	-2389	-3321
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	080726000	08072600017010	MUN	-156	-317	-471	-456	-714	-1005
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	080732000	08073200017010	MUN	-150	-289	-373	-318	-427	-520
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	080734000	08073400017010	MUN	-20	-37	-53	-70	-92	-122
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	084305000	08430500017010	MUN	-168	-385	-739	-1198	-1815	-2532
PORTER WSC	SAN JACINTO	MONTGOMERY	084307000	08430700017010	MUN	-446	-914	-1431	-2038	-2257	-2449
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	084312000	08431200017010	MUN	-530	-971	-1194	-975	-1254	-1460
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	084322000	08432200017010	MUN	-191	-349	-432	-489	-545	-592
ROMAN FOREST	SAN JACINTO	MONTGOMERY	080801000	08080100017010	MUN	-125	-421	-774	-1151	-1657	-2262
SHENANDOAH	SAN JACINTO	MONTGOMERY	080745000	08074500017010	MUN	-401	-858	-1239	-1164	-1761	-2426
SOUTHERN MONTGOMERY COUNTY	SAN JACINTO	MONTGOMERY	084339000	08433900017010	MUN	-436	-1018	-1271	-1069	-1391	-1657
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	084343000	08434300017010	MUN	-58	-119	-187	-263	-368	-497
SPLENDORA	SAN JACINTO	MONTGOMERY	080962000	08096200017010	MUN	-43	-95	-157	-239	-358	-496
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	084344000	08434400017010	MUN	-123	-260	-420	-438	-750	-1120
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	084347000	08434700017010	MUN	-170	-383	-477	-382	-492	-574
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	081002170	08100217017010	PWR	6683	3189	1739	-27	-2181	-4809
THE WOODLANDS	SAN JACINTO	MONTGOMERY	088001000	08800100017010	MUN	-3368	-15302	-16776	-12063	-15437	-17975
WILLIS	SAN JACINTO	MONTGOMERY	080655000	08065500017010	MUN	-130	-275	-429	-438	-712	-1038
WOODBRANCH	SAN JACINTO	MONTGOMERY	080807000	08080700017010	MUN	-42	-85	-119	-152	-193	-243
MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	MUN	-57	-827	-1306	-1779	-1931	-2450
STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	MUN	-18	-45	-83	-133	-204	-305
COUNTY-OTHER	TRINITY	POLK	080757187	08075718718708	MUN	20	-71	-124	-174	-260	-356
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	POLK	084226000	08422600018708	MUN	591	523	474	454	417	367
LIVESTOCK	TRINITY	POLK	081005187	08100518718708	IRR	0	0	0	0	0	0
LIVINGSTON	TRINITY	POLK	080362000	08036200018708	MUN	3464	3084	2799	2595	2389	2178
MINING	TRINITY	POLK	081003187	08100318718708	MIN	0	-2	-3	-4	-5	-6
ONALASKA	TRINITY	POLK	080933000	08093300018708	MUN	0	-40	-71	-92	-113	-136
ONALASKA WSC	TRINITY	POLK	084293000	08429300018708	MUN	0	-4	-7	-2	-6	-15
TRINITY RURAL WSC	TRINITY	POLK	084363000	08436300018708	MUN	18	20	23	24	29	30
COLDSPRING	TRINITY	SAN JACINTO	080122000	08012200020408	MUN	0	-23	-42	-53	-59	-62
COLDSPRING	SAN JACINTO	SAN JACINTO	080122000	08012200020410	MUN	0	-7	-12	-15	-16	-17
COUNTY-OTHER	TRINITY	SAN JACINTO	080757204	08075720420408	MUN	1402	1361	1344	1403	1438	1385
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	080757204	08075720420410	MUN	0	-106	-184	-223	-246	-261
IRRIGATION	TRINITY	SAN JACINTO	081004204	08100420420408	IRR	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY &	SAN JACINTO	SAN JACINTO	084226000	08422600020410	MUN	63	51	41	37	33	29
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	SAN JACINTO	084226000	08422600020408	MUN	137	111	90	81	73	63
LIVESTOCK	TRINITY	SAN JACINTO	081005204	08100520420408	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	SAN JACINTO	081005204	08100520420410	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	SAN JACINTO	081001204	08100120420410	MFR	0	-4	-8	-12	-15	-20
MERCY WSC	SAN JACINTO	SAN JACINTO	084253000	08425300020410	MUN	0	-66	-117	-149	-166	-175
MINING	TRINITY	SAN JACINTO	081003204	08100320420408	MIN	0	0	0	0	0	0
MINING	SAN JACINTO	SAN JACINTO	081003204	08100320420410	MIN	0	0	0	0	0	0
POINT BLANK	TRINITY	SAN JACINTO	081056000	08105600020408	MUN	0	-11	-19	-23	-26	-27
RIVERSIDE WSC	TRINITY	SAN JACINTO	084323000	08432300020408	MUN	0	-29	-58	-110	-142	-177
SAN JACINTO WSC	TRINITY	SAN JACINTO	084328000	08432800020408	MUN	280	212	158	125	109	99
SHEPHERD	TRINITY	SAN JACINTO	080746000	08074600020408	MUN	0	-54	-93	-110	-123	-130
COUNTY-OTHER	TRINITY	TRINITY	080757228	08075722822808	MUN	3927	3881	3876	3898	3929	3938
GROVETON	TRINITY	TRINITY	080255000	08025500022808	MUN	0	0	0	0	0	0
IRRIGATION	TRINITY	TRINITY	081004228	08100422822808	IRR	290	290	290	290	290	290
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	TRINITY	084226000	08422600022808	MUN	72	66	63	59	54	50
LIVESTOCK	TRINITY	TRINITY	081005228	08100522822808	IRR	0	0	0	0	0	0
MINING	TRINITY	TRINITY	081003228	08100322822808	MIN	0	0	0	0	0	0
TRINITY	TRINITY	TRINITY	080610000	08061000022808	MUN	370	368	370	370	370	370
TRINITY RURAL WSC	TRINITY	TRINITY	084363000	08436300022808	MUN	848	828	826	836	841	847
CONSOLIDATED WSC	TRINITY	WALKER	084071000	08407100023608	MUN	0	-1	-1	0	0	0
COUNTY-OTHER	TRINITY	WALKER	080757236	08075723623608	MUN	193	832	776	702	581	439

Region H

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
COUNTY-OTHER	SAN JACINTO	WALKER	080757236	08075723623610	MUN	959	319	376	450	571	713
HUNTSVILLE	TRINITY	WALKER	080292000	08029200023608	MUN	2820	2524	2469	2469	2456	2437
HUNTSVILLE	SAN JACINTO	WALKER	080292000	08029200023610	MUN	14179	12938	12806	12954	12998	12994
IRRIGATION	TRINITY	WALKER	081004236	08100423623608	IRR	0	0	0	0	0	0
IRRIGATION	SAN JACINTO	WALKER	081004236	08100423623610	IRR	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	WALKER	084226000	08422600023608	MUN	19	17	16	16	15	15
LIVESTOCK	TRINITY	WALKER	081005236	08100523623608	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	WALKER	081005236	08100523623610	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	WALKER	081001236	08100123623608	MFR	0	-627	-1324	-1515	-1817	-2155
MANUFACTURING	SAN JACINTO	WALKER	081001236	08100123623610	MFR	0	-92	-176	-262	-337	-416
MINING	TRINITY	WALKER	081003236	08100323623608	MIN	0	0	0	0	0	0
MINING	SAN JACINTO	WALKER	081003236	08100323623610	MIN	0	0	0	0	0	0
NEW WAVERLY	SAN JACINTO	WALKER	080926000	08092600023610	MUN	0	-17	-25	-18	-17	-17
RIVERSIDE WSC	TRINITY	WALKER	084323000	08432300023608	MUN	0	0	-10	-59	-82	-119
TRINITY RURAL WSC	TRINITY	WALKER	084363000	08436300023608	MUN	67	68	68	69	73	76
WALKER COUNTY RURAL WSC	TRINITY	WALKER	084372000	08437200023608	MUN	0	-78	-119	-119	-131	-146
BROOKSHIRE	BRAZOS	WALLER	080077000	08007700023712	MUN	0	-174	-366	-581	-844	-1159
COUNTY-OTHER	SAN JACINTO	WALLER	080757237	08075723723710	MUN	0	-172	-386	-594	-888	-1225
COUNTY-OTHER	BRAZOS	WALLER	080757237	08075723723712	MUN	0	-23	-70	-109	-184	-269
HEMPSTEAD	BRAZOS	WALLER	080271000	08027100023712	MUN	0	-595	-1237	-1970	-2837	-3856
IRRIGATION	SAN JACINTO	WALLER	081004237	08100423723710	IRR	0	-474	0	-13	-1592	-3398
IRRIGATION	BRAZOS	WALLER	081004237	08100423723712	IRR	0	0	0	0	0	0
KATY	SAN JACINTO	WALLER	080312000	08031200023710	MUN	-82	-284	-444	-612	-809	-1041
LIVESTOCK	SAN JACINTO	WALLER	081005237	08100523723710	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	WALLER	081005237	08100523723712	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	WALLER	081001237	08100123723710	MFR	0	-10	-19	-27	-36	-44
MANUFACTURING	BRAZOS	WALLER	081001237	08100123723712	MFR	0	-2	-4	-7	-8	-11
MINING	SAN JACINTO	WALLER	081003237	08100323723710	MIN	0	0	0	0	0	0
MINING	BRAZOS	WALLER	081003237	08100323723712	MIN	0	0	0	0	0	0
PINE ISLAND	BRAZOS	WALLER	080938000	08093800023712	MUN	0	-29	-60	-93	-137	-188
PRAIRIE VIEW	BRAZOS	WALLER	080485000	08048500023712	MUN	0	-82	-178	-289	-429	-597
PRAIRIE VIEW	SAN JACINTO	WALLER	080485000	08048500023710	MUN	0	-9	-20	-32	-47	-66
WALLER	SAN JACINTO	WALLER	080629000	08062900023710	MUN	0	-72	-156	-252	-366	-501

Region H
Table 4A-2: WWP Needs by Type, Basin, and County

WWP	Demand Type	Basin	County	Need 2010	Need 2020	Need 2030	Need 2040	Need 2050	Need 2060
BAYTOWN AREA WATER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	0	26	262	398	535	692
BRAZOS RIVER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	0	47499	29570	49592	67501	88950
BRAZOS RIVER AUTHORITY	MANUFACTURING	BRAZOS	FORT BEND	0	0	406	445	471	396
BRAZOS RIVER AUTHORITY	MANUFACTURING	SAN JACINTO	FORT BEND	0	623	1292	1354	1396	1282
BRAZOS RIVER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	0	0	1615	4484	8140
BRAZOS RIVER AUTHORITY	MINING	BRAZOS	BRAZORIA	0	119	136	154	171	187
BRAZOS RIVER AUTHORITY	MINING	BRAZOS	FORT BEND	0	189	383	389	396	401
BRAZOS RIVER AUTHORITY	MINING	BRAZOS-COLORADO	BRAZORIA	0	431	546	662	807	956
BRAZOS RIVER AUTHORITY	MINING	SAN JACINTO	FORT BEND	0	77	165	168	171	173
BRAZOS RIVER AUTHORITY	MINING	SAN JACINTO-BRAZOS	BRAZORIA	0	73	103	146	195	244
BRAZOS RIVER AUTHORITY	MUNICIPAL	BRAZOS	FORT BEND	0	378	1514	5408	13823	23930
BRAZOS RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	FORT BEND	0	23	61	471	1532	2737
BRAZOS RIVER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	4	1035	1904	9209	17827
BRAZOSPORT WATER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	326	252	130	124	0	0
BRAZOSPORT WATER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	291	4	6	0	0
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	BRAZOS	BRAZORIA	0	116	124	129	137	146
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	BRAZOS-COLORADO	BRAZORIA	1752	1852	2005	2109	2293	2508
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	5672	4802	5611	6939	8503	10531
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	IRRIGATION	TRINITY	CHAMBERS	20376	20600	20734	20857	20975	21076
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	MUNICIPAL	TRINITY	CHAMBERS	0	1084	1245	1387	1538	1695
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	MUNICIPAL	TRINITY-SAN JACINTO	CHAMBERS	0	607	733	848	973	1109
CHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	0	1771	2414	2431	2431	2431
CITY OF HOUSTON	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	6657	6697	6732	6767	6805	5742
CITY OF HOUSTON	MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	4487	8862	12609	17178	19923	18546
CITY OF HOUSTON	MINING	SAN JACINTO	HARRIS	140	274	358	455	546	629
CITY OF HOUSTON	MINING	SAN JACINTO-BRAZOS	HARRIS	3	5	7	9	10	12
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO	HARRIS	11722	27736	34266	47533	77507	106375
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO	MONTGOMERY	0	62	173	305	481	689
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	0	0	201	294	325	0
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	203	0	64	0	4	319
CITY OF HOUSTON	STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	0	5957	9395	16693	22369	26650
CITY OF HOUSTON	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	400	1239	1449	1849	2195	2617
CITY OF PASADENA	MUNICIPAL	SAN JACINTO	HARRIS	508	557	600	659	709	772
CITY OF PASADENA	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	1357	1721	2065	2494	2870	3296
FORT BEND CO. WCID 1	MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	0	148	824	940	1016	1016
FORT BEND COUNTY WCID #2	MUNICIPAL	SAN JACINTO	FORT BEND	0	447	993	993	993	993
FORT BEND COUNTY WCID #2	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	44	99	99	99	99
GALVESTON COUNTY WCID #1	MUNICIPAL	SAN JACINTO-BRAZOS	GALVESTON	0	799	959	990	1025	1064
GULF COAST WATER AUTHORITY	IRRIGATION	BRAZOS	BRAZORIA	1754	1384	1243	1157	1157	1157
GULF COAST WATER AUTHORITY	IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	82741	71681	62691	62777	62970	64614
GULF COAST WATER AUTHORITY	IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	6788	6788	6788	6788	6788	6788
GULF COAST WATER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	13694	13694	51614	51614	51614	51614
GULF COAST WATER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	0	1580	1580	1580	1580
GULF COAST WATER AUTHORITY	MINING	SAN JACINTO-BRAZOS	FORT BEND	0	86	703	717	729	739
GULF COAST WATER AUTHORITY	MINING	SAN JACINTO-BRAZOS	GALVESTON	0	21	24	28	31	34
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	0	49	682	2321	4540	7429
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	0	0	1950	1950	1950
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	GALVESTON	0	3780	4156	4235	4323	4429
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	0	15	15	15	63	146
GULF COAST WATER AUTHORITY	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	0	1381	1992	2819	3828	5057
LOWER NECHES VALLEY AUTHORITY	MINING	NECHES-TRINITY	GALVESTON	16	23	26	29	33	37
MISSOURI CITY	MUNICIPAL	BRAZOS	FORT BEND	0	514	1720	1906	2029	2218
MISSOURI CITY	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	722	1362	1794	2517
MISSOURI CITY	MUNICIPAL	SAN JACINTO	HARRIS	0	0	181	450	696	862
MISSOURI CITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	782	5188	8586	10482	14053
NFBWA	MUNICIPAL	BRAZOS	FORT BEND	0	0	892	1905	3389	5281
NFBWA	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	7700	11775	13327	13887
NFBWA	MUNICIPAL	SAN JACINTO	HARRIS	0	444	732	865	926	939
NFBWA	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	4348	12962	22321	30384	38218
NHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	761	56453	84636	92814	97227	102615
NORTH CHANNEL WATER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	1954	2392	2869	3511	4157	4912
NRG	STEAM ELECTRIC POWER	BRAZOS	FORT BEND	0	0	0	0	0	8500
RICHMOND-ROSENBERG	MUNICIPAL	BRAZOS	FORT BEND	0	0	0	1091	3060	5645
SAN JACINTO RIVER AUTHORITY	MANUFACTURING	SAN JACINTO	MONTGOMERY	0	988	1384	1756	2129	2504
SAN JACINTO RIVER AUTHORITY	MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	23008	27754	31791	35763	38736	37244
SAN JACINTO RIVER AUTHORITY	MINING	SAN JACINTO	MONTGOMERY	0	216	279	331	382	425
SAN JACINTO RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	0	0	5299	15769	15784	17605
SAN JACINTO RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	MONTGOMERY	0	39868	56724	61475	89620	122824
SAN JACINTO RIVER AUTHORITY	STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	0	0	0	0	1593	4307
SUGAR LAND	MUNICIPAL	BRAZOS	FORT BEND	0	1280	4338	4677	4675	4515
SUGAR LAND	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	35	35	35	35
SUGAR LAND	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	162	794	1228	1504	2404
THE DOW CHEMICAL CO.	MANUFACTURING	BRAZOS	BRAZORIA	0	19048	19048	19048	19048	19048
THE DOW CHEMICAL CO.	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	950	2752	2752	2752	2752
TRINITY RIVER AUTHORITY	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	0	0	0	0	0	1091
TRINITY RIVER AUTHORITY	MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	8264	9230	10252	11284	12240	13445
TRINITY RIVER AUTHORITY	MINING	TRINITY	CHAMBERS	4344	6494	7816	9116	10411	11550
TRINITY RIVER AUTHORITY	MINING	TRINITY-SAN JACINTO	CHAMBERS	1215	1359	1904	2488	3081	3677
WHCRWA	MUNICIPAL	SAN JACINTO	FORT BEND	68	238	1801	2472	3091	3747
WHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	2355	31360	44848	51011	53259	55373
WHCRWA	MUNICIPAL	SAN JACINTO	WALLER	65	258	409	566	751	968

Region H

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Screening Factor Weight:																					
Conservation Strategies																					
Industrial Conservation	Manufacturing	Reduce water demand through selected BMPs	All	No	No impact	None	Strategy reduces the demand for additional water supply, but also reduces return flows from existing sources.	Reducesreturn flows from current sources, but the rate of savings does not compenstae for the rate of growth in the largest counties.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure. Reductions in return flows off-set by increase in overall demand.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect on existing supply sources.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Irrigation Conservation	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Various	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Brazoria County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Brazos, Brazos-Colorado	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Chambers County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Trinity	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Galveston County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	San Jacinto - Brazos	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Liberty County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Trinity	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Waller County	Irrigation	Reduce irrigation losses through land leveling, point irrigation	San Jacinto	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Municipal Conservation	Multiple	Reduce demand through various methods	All	No	No impact	None	Strategy reduces the demand for additional water supply, but also reduces per-capita return flows from existing groundwater use.	Reduces per capita return flows from groundwater, but the rate of savings does not compenstae for the rate of population growth.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure. Reductions in return flows off-set by increase in population and total demand.	NA - does not require the construction of new infrastructure.	Reducing per capita water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Contractual Strategies																					
Expand/ Increase Current Contracts	Multiple	Increase existing contracts to meet customer demands	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
New Contracts from Existing Supply	Multiple	Create new contracts from existing unallocated supplies	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reallocation of Existing Supply	Multiple	Reallocate surplus water to WUGs with shortages	Multiple	Yes	Altered location of return flows	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
TRA to SJRA contract	TRA / SJRA	Sell uncommitted supply to SJRA.	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Requires construction of new conveyance.	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	Potential impacts along conveyance route	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
TRA to Houston Contract	TRA / Houston	Sell uncommitted supply to Houston	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Unknown	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	NA - does not require the construction of new infrastructure.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WUG Level Contracts	Multiple WUGs	Contracts from WWPs to WUGs	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WWP Contracts	Multiple WWPs	Contracts between WWPs	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Groundwater Strategies																					

Region H
Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Expanded Use of Groundwater	Multiple	Increase groundwater use, to the sustainable or permitted yield.	All	No	Uses existing supply, return flows remain in basin of origin.	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Interim Strategies	Brazoria, Chambers, Galveston, Harris, and Montgomery Counties	Temporary groundwater use in excess of available supply	Multiple	No	Potential for subsidence and excess drawdown	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
New Groundwater Wells for Livestock	Multiple	Added well capacity to facilitate expaned pumping or interim groundwater use	All	No	None - impacts associated with yield-creating WMS or infrastructure	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Groundwater Reduction Plans																					
CHCRWA GRP	CHCRWA	Conversion of CHCRWA to surface water.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH GRP	COH	Conversion of portions of COH service area to surface water	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	NA - does not require the construction of new infrastructure.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Missouri City GRP	Missouri City	Conversion of Missouri City and surrounding area to surface water. Also includes Aquifer Storage and Recovery.	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County MUD 25 GRP	Fort Bend MUD 25	A combination of reuse and surface water to allow for groundwater reduction.	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County WCID No. 2 GRP	Fort Bend County WCID No. 2	Surface water conversion	San Jacinto, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA GRP	NFBWA	Conversion of NFBWA to surface water. Also includes reuse and major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA GRP	NHCRWA	Conversion of NHCRWA to surface water. Also includes major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Pecan Grove GRP	Pecan Grove	Conversion of Pecan Grove to surface water. Also includes reuse	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Richmond-Rosenberg GRP	Richmond, Rosenberg	Conversion of Richmond-Rosenberg to surface water.	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
River Plantation GRP	River Plantation MUD	Entering into GRP with River Plantation CC golf course to provide additional WWTP effluent for irrigation purposes	San Jacinto	No	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	none	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed.	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	Site surveys must be conducted for each individual well site.	TBD	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
SJRA WRAP	Montgomery County	Conversion of Montgomery County to surface water. Also includes reuse and major water supply infrastructure.	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Sugar Land GRP	Sugar Land	Conversion of Sugar Land and surrounding area to surface water. Also includes reuse.	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
WHCRWA GRP	WHCRWA	Conversion of WHCRWA to surface water. Also includes reuse and major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Infrastructure Strategies																					
CHCRWA Transmission	CHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
CHCRWA Distribution	CHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA Shared Transmission Line	NFBWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA Internal Distribution	NFBWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Transmission	NHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Internal Distribution	NHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WHCRWA Transmission	WHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WHCRWA Internal Distribution	WHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
West Chambers County Supply System	CLCND	Develop a surface water supply system to meet demands in western Chambers County with water from the Trinity basin.	Sabine to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	Will reduce instream flows to convey water to the west	Return flows will be returned to Galveston Bay	Potential impact to habitat along transmission system alignment	Potential impact to wetlands along transmission system alignment	Potential impact to T&E species along transmission system alignment	Potential impact to cultural resources along transmission system alignment			2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH Treatment Expansion	Houston	Increasing capacity in COH treatment facilities infrastructure.	Trinity-San Jacinto, San Jacinto, San Jacinto-Brazos, Brazos	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH Distribution Expansion	Houston	Distrubution expansion for WWP	San Jacinto	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat along transmission corridor.	Potential impact to habitat along transmission corridor.	Potential impact to habitat along transmission corridor.	Potential impact to cultural resources along transmission corridor.	N/A	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed	Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Huntsville WTP	Huntsville	WTP construction to utilize existing contracts	Trinity, San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	Chapter 5 details the impacts of management strategies on water quality, and provides	Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Harris County MUD 50 SWTP	Harris MUD 50	Treat surface water from SJRA for municipal use.	San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
LLWSSSC Surface Water Project	Lake Livingston Water Supply and Sewer Service Company	Expansion of SWTP to meet municipal demands	Trinity	No	Potential impact to habitat on site	Land required for facility expansion	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Luce Bayou	COH	Development of a conveyance fro the Trinity River to Lake Houston	Trinity to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	Reduces flow in the Trinity River below Liberty.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Conveyance requires 23.6 miles of canal. Blending supply in Lake Houston may affect lake habitat.	Potential impact due to diversion structure. Potential wetland impacts due to project.	Potential impact to White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River. Increased flow in Luce Bayou may impact Creek Chubsucker habitat.	Privately owned ranches and farms along Luce Bayou. Pump station study identified historic homestead, which was studied and cataloged at the time of the original permit.			2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Sealy GW Treatment Expansion	Sealy	Expansion of a SWTP	Brazos	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habita on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Pearland SWTP	Pearland	Installation of a SWTP	San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habita on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reservoir Strategies																					
Allens Creek Reservoir	BRA / Houston	New reservoir in Austin County	Brazos	No	Wetlands and bottomland hardwoods impacted	Innundates 7,000 acres	Diverts peak flows. When base flow is above median, diversions cannot reduce it below media. When base flow is above 25th percentile, diversions cannot reduce it below 25th percentile. Below 25th percentile, diversions cannot reduce it below a 7Q2.	Divert peak flows, reducing magnitude of storm flush.	Innundates 7,000 acres	Sire specific study ongoing. Potential impact from 700 to 1700 wetland acres, based upon initial studies.	Austin County is habitat for White-faced Ibis, Wood Stork and Houston Toad.	Site located near the town of Wallis. A detailed site survey must be conducted.	0	Reservoir modeled using minimum in-stream flow requirement.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Little River Off-Channel Reservoir	BRA	New reservoir in Milam County	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4400 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Will have substantial impacts on the instream biological community at the proposed reservoir site. However, there would be minimal impacts in the Little River diversion site. It is not likely that this project, alone, would have a substantia influence on total discharge in the Brazos River, in which case there would be minimal influence on freshwater inflows to the Brazos River estuary. However, the cumulative impact of multiple projects may reduce freshwater inflows into the estuary.	Would innundate 4,343 acres; Projected wildlife habitat that will be impacted includes 2,215 acres of Mixed Grassland, 1,839 acres of Post Oak Woods, and 289 acres of Mixed Riparian Woods/Forest.	0	The species that could occur within the vicinity of the site include Houston toad, bald eagle interior least tern, piping plover, and whooping crane, and Navasota ladies'-tresses.	31 archeological sites have been documented within the general vicinity of the proposed reservoir Pin Oak Cemetery may lie within the reservoir site; Prior to reservoir inundation, the project must be coordinated with the Texas Historical Commission and a cultural resources survey must be conducted to determine if any cultural resources are present within the conservation pool.	0	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to the reservoir and Little River diversion having to pass inflows to meet CCEFN instream flow requirements	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	The project is expected t have negligible impacts t the stream flow and wate quality in the Little River and Brazos River.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Brazoria County Off-Channel Reservoir	Brazoria County	New reservoir in Brazoria County	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impac bay and estuary inflows.	TBD	TBD	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County Off-Channel Reservoir	Fort Bend County	New reservoir in Fort Bend County	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impac bay and estuary inflows.	TBD	TBD	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
GCWA Off-Channel Reservoirs	GCWA	Use storage to enhance the yield of existing GCWA rights	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impac bay and estuary inflows.	Project would innundate approximatly 2,900 acres habitat in the area to be investigated further.	Project would innundate approximatly 2,900 acres habitat in the area to be investigated further.	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to the reservoir and diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reuse Strategies																					
Fulshear Reuse	Fulshear	Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.	Brazos, San Jacinto-Brazos	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Houston Indirect Wastewater Reuse	Houston	Reuse wastewater from all city WWTP's in lieu of Trinity Supply.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed. Reuse of supplies in San Jacinto Basin reduces potential need for transfer from Trinity Basin.	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	NA	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Montgomery County MUDs 8/9 Reuse	Montgomery MUDs 8/9	Reuse water from Montgomery County MUDs 8/9	San Jacinto	No	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	none	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed.	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD	TBD		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Indirect Wastewater Reuse	NHCRWA	Reuse wastewater from member WWTP's in lieu of purchasing additional supply.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed. Reuse of supplies in San Jacinto Basin reduces potential need for transfer from Trinity Basin.	Majority of the needed infrastructure will be constructed in urbanized areas. Therefore, the impact to wildlife habitat will be limited.	Majority of the needed infrastructure will be constructed in urbanized areas. Therefore, the impact to wetlands will be limited.	Potential impact to Creek Chubsucker and Alligator Snapping Turtle habitat through reduced wastewtaer return flows.	NA	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Wastewater Reclamation for Industry	Houston, Manufacturing	Deliver treated waterwater to industry for use in lieu of Trinity River supply.	San Jacinto	No	Minimal change in habitat	None	Reduces municipal return flows into Sims and Buffalo Bayous. Manufacturign return flows into the ship channel will not be affected.	Reuse water is intended to off-set supply transferred from Lake Livingston, leaving the inflows for Trinity Bay vice Upper Galveston Bay	Sims and Buffalo Bayous will realize reduced freshwater flows due to reuse. Central treatment facility may impact up to 15 acres of undeveloped land.	4 new pipeline crossings may impact 6 acres (assumed 1.5 acres each).	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced wastewtaer return flows.	Project is within an industrial area, but site studies must still be conducted for new facilities.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Wastewater Reclamation for Municipal Irrigation	County-Other and Authorities in Brazoria, Fort Bend, Harris, and Montgomery Counties	Reuse for municipal irrigation	Multiple	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	Potential to reduce return flows in specific basin of use.	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	NA	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Permit Strategies																					
BRA System Operations Permit	BRA	Use peak flows, when available, and systems management to reduce the use of water stored under other permits.	Brazos	No	Harvests peak flows through system management, positive affect on below-median flows	New pump stations may be required.	Diverts from streamflows when above median flow, reducing peaks. Releases from storage when below median flows, increasing the flows above diversion points.	Reduces peak flushing effects due to diversions above median flows. Flows below median are minimally affected.	Application points to the deferred or eliminated need for Little River Reservoir	Application points to the deferred or eliminated need for Little River Reservoir. New diversion points must be assessed as needed.	None discussed in permit application. Deferring Little River Reservoir reduces overall basin impact.	Application points to the deferred or eliminated need for Little River Reservoir	N/A	TCEQ Draft permit has been granted	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Houston Bayous Permit	Houston	Use peak flows, when available, to reduce the use of water stored under other permits.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Permit applications refer to capturing peak flows. Model includes current Lake Houston instream flow requirement	Permit applications refer to capturing peak flows. Model includes current Lake Houston instream flow requirement	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	N/A - Does not recommend new diversion point	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Other Strategies																					
Brazoria County Interruptible Supplies for Irrigation	GCWA	Use of interruptible portion of GCWA water right for irrigation	San Jacinto-Brazos	No	Reduced flows in Brazos River due to increased diversion	None	Use of interruptible supplies will decrease instream flows														
Brazos Salt Water Barrier	BRA / DOW	Prevent the seasonal migration of the saltwater wedge upstream to protect existing diversion points.	Brazos	No	Will influence flood plain response to major storms.	New structure in river channel	Structure will create a pool during low-flow periods, but river flows should spill at the same rate as before the structure.	The structure will be designed not to impound seasonal low flows.	The structure will fill [TBD] acreas. Access road will require [TBD] acres. The introduction of the barrier may impact migratory fish species.	The structure will affect [TBD] acres of river bottomlands.	Potential habitat impacts to Black Rail, White-faced Ibis, Wood Stork, Diamondback Terrapin and Corkwood.	Siting study is required to identify any cultural resources being impacted. Site will be above Sea Center Texas hatchery.	Strategy reduces the influence of saltwater migration upstream to protect freshwater diversion points. This reduces the need for replacement supplies.	NA - strategy will not impound water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Freeport Desalination	BRA / DOW	Desalinate seawater for industrial and municipal use.	Brazos, San Jacinto-Brazos	No	Offsets some use of Brazos basin flows.	New facility may require some land clearing.	Displacemnet of water that is currently diverted to meet municipal demands.	Saline water release is made into Dow discharge canal that empties directly into the Gulf of Mexico.	As many as 530 acres of property impacted by the installation of delivery lines, some of which follow existing easements.	Same as wildlife impact potential.	Unknown. Will require assessment before implementation of the strategy.	Will require study before implementation of the strategy.	Will require study before implementation of the strategy.	Will require study before implementation of the strategy.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Montgomery County MUD 8/9 Brackish Desal	Montgomery County MUDs 8 and 9	Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.	San Jacinto	No	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Sabine to Region H Transfer	Harris / Montgomery Counties	Transfer existing supply from Toledo Bend Reservoir to Region H.	Sabine to San Jacinto	Yes	Potential introduction of invasive species / Reduction of freshwater inflows to Sabine Lake	TBD	Displacement of water from Lake Livingston and reduced use of Livingston water in lower basin will result in reduced flow between the lake and the IBT discharge point on the Trinity.	Inflows to Sabine Lake could potentially be impacted.	Nearly entire Neches-Trinity segment is within Priority 3, 5, and 6 designated bottomland hardwood.	Wetlands would be affected in the majority of areas crossed by new canal segments.	Route would potentially impact the Bald Eagle, Brown Pelican, Houston Toad, Interior Least Tern, Louisians Pike Snake, Navasota Ladies'-tresses, Northern Scarlet Snake, Red-cockaded Woodpecker, and Smooth Green Snake.	Private proerty along the transfer route, especially in sections of entirely new canal or pipeline. The segment between Lake Livingston and the San Jacinto River passes through the Sam Houston National Forest.	0	0	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Region H
Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**				
Conservation Strategies																								
Industrial Conservation	Manufacturing	Reduce water demand through selected BMPs	TBD	TBD		2010	TBD	All	No	No impact	None	0	0	1	0	0	0	1	0	1		3	No	No
Irrigation Conservation																								
Brazoria County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$1,850,200 annual cost, on-farm methods $198,200 capital cost, canal lining	$99		2010	18,792	Brazos, Brazos-Colorado	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Chambers County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$2,336,300 annual cost, on-farm methods $279,200 capital cost, canal lining	$98		2010	24,018	Trinity	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Fort Bend County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$509,900 annual cost, on-farm methods $56,500 capital cost, canal lining	$99		2010	5,198	Brazos, Brazos-Colorado, San Jacinto-Brazos	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Galveston County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$231,100 annual cost, on-farm methods $29,400 capital cost, canal lining	$98		2010	2,392	San Jacinto - Brazos	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Liberty County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$2,089,800 annual cost, on-farm methods i $188,700 capital cost, canal lining	$100		2010	20,877	Trinity	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Waller County	Irrigation	Reduce irrigation losses through land leveling, point irrigation	$726,700 annual cost, on-farm methods	$110		2050	6,606	San Jacinto	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Municipal Conservation	Multiple	Reduce demand through various methods	From $9.9 to $22.8 million for allWUGs collectively	$202 (Sm Sys) $311 (Med Sys) $213 (Lg Sys)		2010	From 45,605 to 105,494	All	No	No impact	None	0	1	1	0	0	1	1	0	1		5	Yes	Yes
Contractual Strategies																								
Expand/ Increase Current Contracts	Multiple	Increase existing contracts to meet customer demands	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	1	0	1	0	0	1	1	0	1		5	Yes	Yes
New Contracts from Existing Supply	Multiple	Create new contracts from existing unallocated supplies	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	1	0	1	0	0	1	1	0	1		5		Yes
Reallocation of Existing Supply	Multiple	Reallocate surplus water to WUGs with shortages	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Altered location of return flows	None	1	0	1	0	0	1	1	0	1		5	No	No
TRA to SJRA contract	TRA / SJRA	Sell uncommitted supply to SJRA.	$302,781,597	$687	Y	2040	76,476	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Requires construction of new conveyance	0	1	0	0	0	0	0	-1	0		0	No	Yes
TRA to Houston Contract	TRA / Houston	Sell uncommitted supply to Houston	None - Infrastructure cost already reflected under Luce Bayou WMS	None - Infrastructure cost already reflected under Luce Bayou WMS	Y	2030	123,524	Trinity to San Jacinto	Yes	Potential introduction of invasive species via Luce Bayou conveyance.	Unknown	1	1	0	0	0	1	1	-1	0		3	Yes	Yes
WUG Level Contracts	Multiple WUGs	Contracts from WWPs to WUGs. Includes contracts for volumes created under other yield-producing WMS	WUG-specific infrastructure	Contract Rate		2010	Varies by contract. No new supply created	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
WWP Contracts	Multiple WWPs	Contracts between WWPs. Includes contracts for volumes created under other yield-producing WMS	N/A - cost associated with WWP infrastructure projects	Contract Rate		2010	Varies by contract. No new supply created	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Groundwater Strategies																								
Expanded Use of Groundwater	Multiple	Increase groundwater use, to the sustainable or permitted yield.	$589,500 per 1 mgd well. $165,928,999 total capital cost for WUG infrastructure	$205		2010	90,617	All	No	Uses existing supply, return flows remain in basin of origin.	New wells may require some land clearing.	0	1	1	1	0	1	0	0	0		4	Yes	
Interim Strategies	Brazoria, Chambers, Galveston, Harris, and Montgomery Counties	Temporary groundwater use in excess of available supply	$589,500 per 1 mgd well. $86,701,535 total capital cost for WUG infrastructure	$788	Y	2010	NA - temporary use of 45,512 ac-fy/yr	Multiple	No	Potential for subsidence and excess drawdown	New wells may require some land clearing.	1	1	1	0	-1	1	0	1	0		4	No	No
New Groundwater Wells for Livestock	Multiple	Added well capacity to facilitate expaned pumping or interim groundwater use	$18,635	$37		2010	41	San Jacinto-Brazos, Neches-Trinity	No	None - impacts associated with yield-creating WMS or infrastructure	New wells may require some land clearing.	0	NA	1	1	0	1	0	0	0		3	No	Yes
Groundwater Reduction Plans																								

Region H
Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
CHCRWA GRP	CHCRWA	Conversion of CHCRWA to surface water.	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0			2	No	No
COH GRP	COH	Conversion of portions of COH service area to surface water	See COH Treatment Expansion and Distribution Expansion	See COH Treatment Expansion and Distribution Expansion		2010	NA	Multiple		Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0				No	No
Missouri City GRP	Missouri City	Conversion of Missouri City and surrounding area to surface water. Also includes Aquifer Storage and Recovery.	$92,070,990 capital cost to WWP, $8,397,800 infrastructure cost to participating WUGs	$378 per ac-ft (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2013)	4,790 (new supply from reuse + ASR)	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Fort Bend County MUD 25 GRP	Fort Bend MUD 25	A combination of reuse and surface water to allow for groundwater reduction.	$766,100 capital cost (estimated as $564 per acre-foot construction cost based on Wastewater Reuse for Municipal Irrigation WMS).	$499 for infrastructure - does not include customer contract rate		2020 (2013)	589 (Reuse)	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Fort Bend County WCID No. 2 GRP	Fort Bend County WCID No. 2	Surface water conversion	$24,828,857	$353		2020 (2013)	NA	San Jacinto, San Jacinto-Brazos	No	Potential disturbance due to construction.	due to transmission line construction. Land required for plant	-1	0	1	0	0	1	0	0			1	No	No
NFBWA GRP	NFBWA	Conversion of NFBWA to surface water. Also includes reuse and major water supply infrastructure.	$1,638,000 infrastructure cost to WUGS. WWP infrastructure detailed seperately.	See inf. Cost		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2	No	No
NHCRWA GRP	NHCRWA	Conversion of NHCRWA to surface water. Also includes major water supply infrastructure.	$17,814,600 infrastructure cost to WUGS. WWP infrastructure detailed seperately.	See inf. Cost		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2	No	Yes
Pecan Grove GRP	Pecan Grove	Conversion of Pecan Grove to surface water. Also includes reuse	$15,960,000	$865		2020 (2013)	NA	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Richmond-Rosenberg GRP	Richmond, Rosenberg	Conversion of Richmond-Rosenberg to surface water.	$117,220,150 capital cost for WWP	NA - existing contract		2020 (2015)	NA	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0			2	No	No
River Plantation GRP	River Plantation	Entering into GRP with River Plantation CC golf course to provide additional WWTP effluent for irrigation purposes	$484,926	495		2010	NA	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0			2	No	No
SJRA WRAP	Montgomery County	Conversion of Montgomery County to surface water. Also includes reuse and major water supply infrastructure.	$900,000,000 capital cost for WWP. $217,856,853 infrastructure cost for participating WUGs.	$649. (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2015)	NA	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
Sugar Land GRP	Sugar Land	Conversion of Sugar Land and surrounding area to surface water. Also includes reuse.	$161,360,000 capital cost for WWP. $6,360,100 infrastructure cost for participating WUGs.	$1,234. (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2013)	NA	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
WHCRWA GRP	WHCRWA	Conversion of WHCRWA to surface water. Also includes reuse and major water supply infrastructure.	$35,269,000 infrastructure cost for participating WUGs. WWP infrastructure detailed seperately.	See WHCRWA Transmission and WHCRWA Internal Distribution.		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2		Yes
Infrastructure Strategies																								
CHCRWA Transmission	CHCRWA	Transmission capacity development	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant		0	1	0	0	1	0	0			2	No	No
CHCRWA Distribution	CHCRWA	Distribution capacity development	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant		0	1	0	0	1	0	0			2	No	No
NFBWA Shared Transmission Line	NFBWA	Transmission capacity development	$213,000,000 capital cost	$150		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No

Region H
Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
NFBWA Internal Distribution	NFBWA	Distribution capacity development	$225,000,000 capital cost	$85		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	1	0	1	0	0	1	0	0	0		3	No	No
NHCRWA Transmission	NHCRWA	Transmission capacity development	$253,249,100 capital cost	$106		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No
NHCRWA Internal Distribution	NHCRWA	Distribution capacity development	$535,881,400 capital cost	$222		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
WHCRWA Transmission	WHCRWA	Transmission capacity development	$290,084,200 capital cost	$178		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No
WHCRWA Internal Distribution	WHCRWA	Distribution capacity development	$552,472,000 capital cost	$338		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
West Chambers County Supply System	CLCND	Develop a surface water supply system to meet demands in western Chambers County with water from the Trinity basin.	$20,380,000	$408		2020	NA	Sabine to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species		-1	0	1	0	0	1	0	0	0		1	No	No
COH Treatment Expansion	Houston	Increasing capacity in COH treatment facilities infrastructure.	$2,045,672,200 capital cost	$1,003		Various	NA	Trinity-San Jacinto, San Jacinto, San Jacinto-Brazos, Brazos	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed.	-1	1	1	0	0	1	0	0	1		3	No	No
COH Distribution Expansion	Houston	Distrubution expansion for WWP	$261,040,000	TBD		2010 (2011)	NA	San Jacinto	No	Footprint of facilities largely already developed.	largely already developed.		1	0	0	0	1	0	0	1		3	No	No
Huntsville WTP	Huntsville	WTP construction to utilize existing contracts	$61,023,900 capital cost (estimated using Region H standard cost assumptions).	$587		2010	NA	Trinity, San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	1	1	0	0	1	0	0	0		2	No	No
LLWSSSC Surface Water Project	Lake Livingston Water Supply and Sewer Service Company	Expansion of SWTP to meet municipal demands	$3,087,974	$373		2010	NA	Trinity	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Harris County MUD 50 SWTP	Harris MUD 50	Treat surface water from SJRA for municipal use.	$6,131,600	$736		2020	NA	San Jacinto	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Luce Bayou	COH	Development of a conveyance from the Trinity River to Lake Houston	$253,917,000 capital cost	$91		2020	NA	Trinity to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	1	0	1	0	-1	1	-1	-1	0		0	Yes	Yes
Sealy GW Treatment Expansion	Sealy	Expansion of a SWTP	$6,450,000	$966		2020	NA	Brazos	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Pearland SWTP	Pearland	Installation of a SWTP	$265,000,000	$848		2010	NA	San Jacinto - Brazos	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Reservoir Strategies																								
Allens Creek Reservoir	BRA / Houston	New reservoir in Austin County	$222,752,400	$197	Y	2020	99,650	Brazos	No	Wetlands and bottomland hardwoods impacted	Innundates 7,000 acres	0	0	1	1	-1	1	0	-1	1		2	Yes	Yes
Bedias Reservoir	SJRA	New Reservoir in Madison/Grimes Counties	$247,241,628	$237	Y	2030	90,700	Trinity	No	7,300 acres of bottomland hardwoods	Innundates 27,400 acres	0	0	0	0	-1	0	-1	-1	-1		-4	Yes	No
Little River Reservoir	BRA / GCWA	New reservoir in Milam County	$556,520,000	$328	Y	2040	119,000	Brazos	No	Listed and endangered species habitat	Innundates 35,600 acres	-1	0	0	0	-1	-1	-1	-1	0		-5	Yes	No
Little River Off-Channel Reservoir	BRA	New reservoir in Milam County	$137,356,000	$436	Y	2040	27,255	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,400 acres	-1	-1	0	0	0	0	0	-1	1		-2	No	Yes
Brazoria Off-Channel Reservoir	Brazoria County	New reservoir in Brazoria County	$173,898,602	$1,206	Y	2030	24,000	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 3,200 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
Fort Bend Off-Channel Reservoir	Fort Bend County	New reservoir in Fort Bend County	$202,514,788	1893 (based on allocated volume)	Y	2030	46,000	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 3,000 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
GCWA Off-Channel Reservoirs	GCWA	Use storage to enhance the yield of existing GCWA rights	$197,448,012	$827	Y	2030	39,530	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
Lower Lake Creek Reservoir	SJRA	New reservoir in Montgomery County	$480,777,860	$583	Y	2040	67,200	San Jacinto	No	Inundates about 13,100 acres including 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, and pine forest, and 1,800 acres of shrubland and grasses. Some Endangered Species Identified	There are about 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, pine forest, and 1,800 acres of shrubland and grasses.	-1	1	0	0	-1	0	-1	-1	1		-2	No	No
Millican Reservoir (Panther Creek Dam)	BRA	New reservoir in Brazos, Madison, Leon, and Robertson Counties	$1,159,907,000	$1,241 (allocated portion only - for fully-utilized reservoir, unit cost is $424 per acre-foot)	Y	2040	194,500	Brazos	No	Some endangered species have been identified. Innundates 71,000 acres. Approximately 17,000 acres of mixed bottomland hardwoods. Probable high environmental impacts.	Innundates 71,000 acres. Approximately 17,000 acres of mixed bottomland hardwoods.	-1	0	-1	0	-1	0	-1	-1	0		-5	No	No

Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
Millican-Bundic Reservoir	BRA	New reservoir in Brazos, Madison, Leon, and Robertson Counties	$720,224,000	$1,431	Y	2030	36,990	Brazos		Avoids Manning and Yegua lignite, avoids Kurten oil and gas field, avoids the Wilcox lignite in the upper river reaches and avoids significant bottomland hardwood population. Size of lake would be constrained by the Wilcox lignite, and inundation of marsh area upstream of Old San Antonio Road. Probable moderate to high environmental and instream flows impacts.	The inundation area impacts approximately and 9,210 acres of mixed Bottomland Hardwood Forest, 4,086 acres of Grasses/Forbs, and 1,334 acres of Post Oak Woods.	-1	0	-1	0	-1	0	-1	-1	0		-5	No	No
Reuse Strategies																								
Fulshear Reuse	Fulshear	Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.	$566,600 capital cost (estimated as $564 per acre-foot construction cost based on Wastewater Reuse for Municipal Irrigation WMS).	$502		2020	430	Brazos, San Jacinto-Brazos	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	-1	0	1	1	0	1	0	-1	0		1	No	No
Houston Indirect Wastewater Reuse	Houston	Reuse wastewater from all city WWTP's in lieu of Trinity Supply.	$721,822,900 infrastructure cost for participating WUGs.	$402 to $1,232 per ac-ft ($777 average)	Y	2020	Up to 490,223	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	0	1	1	0	0	0	-1	-1	1		1	Yes	Yes
Montgomery County MUDs 8/9 Reuse	Montgomery MUDs 8/9	Reuse water from Montgomery County MUDs 8/9	$12,245,700	$878 per acre-foot (based on allocated volume)		2020 (2016)	1,120 (max)	San Jacinto	No	This WMS willnot be permitted to negatively impact downstream rights.	none	-1	1	1	0	1	1	0	0	0		3	No	No
NHCRWA Indirect Wastewater Reuse	NHCRWA	Reuse wastewater from member WWTP's in lieu of purchasing additional supply.	$66,778,694	$702 per acre-foot allocated	Y	2010	Up to 157,000	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	0	1	1	0	0	0	-1	-1	1		1	Yes	Yes
Wastewater Reclamation for Industry	Houston, Manufacturing	Deliver treated waterwater to industry for use in lieu of Trinity River supply.	$332,051,761	$893	Y	2010	67,200	San Jacinto	No	Minimal change in habitat	None	-1	1	1	1	0	1	0	1	1		5	Yes	Yes
Wastewater Reclamation for Municipal Irrigation	County-Other and Authorities in Brazoria, Fort Bend, Harris, and Montgomery Counties	Reuse for municipal irrigation	$48,043,200 infrastructure cost for participating WUGs.	$539 average		2030	36,388 (in 2060)	Multiple	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	-1	0	1	1	0	1	0	-1	0		1	No	No
Permit Strategies																								
BRA System Operations Permit	BRA	Use peak flows, when available, and systems management to reduce the use of water stored under other permits.	TBD – based on system rate of $61 per acre-foot	TBD – based on system rate of $61 per acre-foot	Y	2020 (2015)	25,350 (Region H)	Brazos	No	Harvests peak flows through system management, positive affect on below-median flows	New pump stations may be required.	1	1	1	0	0	1	-1	0	0		3	Yes	Yes
Houston Bayous Permit	Houston	Use peak flows, when available, to reduce the use of water stored under other permits.	$20,956,000	System rate		NA	0	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	1	-1	1	0	-1	1	-1	0	0		0	Yes	Yes
Other Strategies																								
Brazoria County Interruptible Supplies for Irrigation	GCWA	Use of interruptible portion of GCWA water right for irrigation	NA	NA		2010	Non-firm 124,000 64,000 w/ GCWA off-channel)	Brazos, San Jacinto-Brazos	No	Reduced flows in Brazos River due to increased diversion	None	1	1	1	0	0	0	0	-1	0		2	NA	NA
Brazos Salt Water Barrier	BRA / DOW	Prevent the seasonal migration of the saltwater wedge upstream to protect existing diversion points.	$44,470,700	NA		2030	NA	Brazos	No	Will influence flood plain response to major storms.	New structure in river channel	0	-1	1	1	0	0	0	1	1		3	NA	Yes
Freeport Desalination	BRA / DOW	Desalinate seawater for industrial and municipal use.	$85,233,000 (11,200AF) - $255,699,000 (33,600AF)	$1,730 to $2,376	Y	2040	11,200 to 33,600	Brazos, San Jacinto-Brazos	No	Offsets some use of Brazos basin flows.	New facility may require some land clearing.	-1	1	1	1	0	0	0	0	0		2	No	Yes
Montgomery County MUD 8/9 Brackish Desal	Montgomery County MUDs 8 and 9	Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.	TBD	TBD		2010 (2014)	Up to 2,240 acre-feet per year (average 2.0 MGD)	San Jacinto	No	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	No	No
Sabine to Region H Transfer	Harris / Montgomery Counties	Transfer existing supply from Toledo Bend Reservoir to Region H.	$760,813,320	Dependent on volume that would be allocated if selected as an an alternative.	Y	2030	From 26,762 (2020) to 486,500 (2060)	Sabine to San Jacinto	Yes	Potential introduction of invasive species / Reduction of freshwater inflows to Sabine Lake	1398-acres	0	1	-1	0	-1	-1	-1	-1	1		-3	NA	No
Galveston County Desal	GCWA		TBD	TBD				San Jacinto-Brazos			Unknown	-1	0	1	1	0	0	0	0	0		1	No	No

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Austin						
Initial Shortage	0	-739	-1,240	-1,496	-1,635	-1,865
Expanded GW	0	739	1,240	1,496	1,635	1,865
Municipal Conservation	0	223	251	265	273	285
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	223	251	265	273	285
Brazoria						
Initial Shortage	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Expanded GW	0	4,049	12,988	13,515	15,658	16,209
Municipal Conservation	1,476	2,610	2,978	3,249	3,567	3,918
Contract Expansions	7,750	7,750	7,750	7,750	7,750	7,750
Net Shortage	-141,681	-172,351	-187,918	-214,074	-239,430	-271,322
Irrigation Conservation	18,792	18,792	18,792	18,792	18,792	18,792
Wastewater Reclamation for Mun. Irrigation	0	0	116	227	344	465
Brazoria Co. Interruptible Supplies for Irr.	98,189	86,759	64,000	64,000	64,000	64,000
Reallocate Existing Supply	13,694	13,694	13,895	13,988	14,019	13,694
Interim Strategies	24,916	0	0	0	0	0
GCWA Offchannel Reservoir	0	0	39,500	39,500	39,500	39,500
Allens Creek Lake/Reservoir	0	45,277	41,779	66,665	58,092	66,196
BRA System Operations Permit	0	3,010	3,010	3,010	3,010	3,010
Brazoria OCR	0	0	0	0	0	24,000
Freeport Desalination Plant	0	0	0	0	33,600	33,600
Dow Offchannel Reservoir	0	21,800	21,800	21,800	21,800	21,800
New Groundwater Wells for Livestock	0	27	27	27	27	27
Total after Recommendations	13,910	17,008	15,001	13,935	13,754	13,762
Chambers						
Initial Shortage	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Expanded GW	0	577	681	796	905	1,010
Municipal Conservation	137	195	219	239	263	291
Contract Expansions	0	0	0	0	0	0
Net Shortage	-42,383	-46,640	-49,931	-53,216	-56,444	-59,764
Irrigation Conservation	24,018	24,018	24,018	24,018	24,018	24,018
CLCND W Chambers System	0	1,691	1,978	2,235	2,511	2,804
Reallocate Existing Supply	21,010	21,264	21,389	21,509	21,627	21,725
Interim Strategies	903	0	0	0	0	0
New Contract from Existing Supply	13,823	17,083	19,972	22,888	25,732	28,672
Total after Recommendations [1]	17,371	17,416	17,426	17,434	17,444	17,455

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Fort Bend						
Initial Shortage	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Expanded GW	0	6,886	3,423	3,813	4,378	5,052
Municipal Conservation	1,435	7,077	10,277	12,253	14,678	17,497
Contract Expansions	0	367	1,295	1,226	1,225	1,016
Net Shortage	1,349	2,920	-37,613	-67,088	-103,342	-155,383
Irrigation Conservation	5,197	5,197	5,197	5,197	5,197	5,197
WHCRWA GRP	0	0	0	0	0	0
NFBWA GRP	0	0	0	0	0	0
Sugar Land GRP	0	488	4,921	4,835	4,915	4,961
Missouri City GRP	0	4,401	4,401	4,401	4,401	4,401
Wastewater Reclamation for Mun. Irrigation	0	0	2,136	4,744	8,403	12,277
Fort Bend MUD 25 GRP	0	589	589	589	589	589
BRA System Operations Permit	0	3,611	15,860	22,340	22,340	22,340
Fort Bend OCR	0	0	0	0	90	45,943
Allens Creek Lake/Reservoir	0	0	0	6,605	25,864	16,145
TRA to Houston Contract	0	0	13,813	27,824	39,179	39,179
Reallocate Existing Supply	0	0	4,687	4,510	3,720	13,762
Fulshear Reuse	0	287	430	430	430	430
Industrial Conservation	0	558	558	558	558	558
Total after Recommendations	6,546	18,051	14,979	14,945	12,344	10,399
Galveston						
Initial Shortage	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Expanded GW	0	811	1,352	1,350	1,352	1,352
Municipal Conservation	768	846	886	896	903	914
Contract Expansions	0	25,630	25,630	25,630	25,630	25,630
Net Shortage	-15,539	10,821	10,081	9,138	8,001	6,620
Irrigation Conservation	2,392	2,392	2,392	2,392	2,392	2,392
New Contract from Existing Supply	16	23	26	29	33	37
Interim Strategies	6,410	0	0	0	0	0
Allens Creek Lake/Reservoir	0	12,101	13,234	14,175	15,310	16,687
New Groundwater Wells for Livestock	0	14	14	14	14	14
Interruptible Supplies for Irr.	6,788	0	0	0	0	0
Total after Recommendations	67	25,351	25,747	25,748	25,750	25,750
Harris						
Initial Shortage	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Expanded GW	0	15,481	27,659	27,693	27,727	27,560
Municipal Conservation	37,292	46,836	51,902	56,748	61,656	66,947
Contract Expansions	0	108,852	66,039	51,840	42,538	31,971
Net Shortage	-14,121	-23,756	-124,701	-187,430	-243,493	-332,031
New Contract from Existing Supply	23,008	31,264	38,732	54,777	54,805	54,849
NHCRWA GRP	0	0	0	0	0	0
WHCRWA GRP	-65	-258	-409	-566	-751	-968
COH GRP	0	0	0	0	0	0
Missouri City GRP	0	386	386	386	386	386
Wastewater Reclamation for Mun. Irrigation	0	0	3,268	6,616	10,027	13,431
Reallocate Existing Supply	18,253	15,276	7,308	19,232	30,220	96,881
Interim Strategies	15	0	0	0	0	0
Allens Creek Lake/Reservoir	0	15	83	336	384	622
TRA to Houston Contract	0	0	93,744	86,519	75,164	75,164
NHCRWA Indirect Reuse	0	0	0	7,300	16,300	16,300
Wastewater Reuse for Industry	0	0	0	0	0	67,200
Houston Indirect Reuse	0	0	0	66,420	114,679	128,801
Total after Recommendations	27,090	22,927	18,411	53,590	57,721	120,635

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Leon						
Initial Shortage	0	-376	-614	-707	-779	-908
Expanded GW	0	376	614	707	779	908
Municipal Conservation	0	126	140	124	107	116
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	126	140	124	107	116
Total after Recommendations	0	126	140	124	107	116
Liberty						
Initial Shortage	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363
Expanded GW	0	2,537	4,590	6,809	9,399	12,544
Municipal Conservation	0	539	641	744	868	995
Contract Expansions	0	0	0	0	0	0
Net Shortage	-11,846	-12,066	-13,456	-14,986	-16,794	-18,824
Irrigation Conservation	20,876	20,876	20,876	20,876	20,876	20,876
Reallocate Existing Supply	6,657	6,697	6,732	6,767	6,805	6,833
Total after Recommendations	15,687	15,507	14,152	12,657	10,887	8,885
Madison						
Initial Shortage	-1	-130	-228	-239	-323	-450
Expanded GW	0	130	228	239	323	450
Municipal Conservation	1	91	110	112	116	119
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	91	110	112	116	119
Total after Recommendations	0	91	110	112	116	119
Montgomery						
Initial Shortage	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Expanded GW	0	5,615	4,471	5,614	9,034	11,820
Municipal Conservation	4,460	6,007	7,384	8,838	10,795	13,089
Contract Expansions	0	0	0	0	0	0
Net Shortage	-13,268	-35,997	-57,658	-66,898	-100,569	-140,253
MUD 8 AND 9 Reuse	0	657	816	1,120	1,120	1,120
Wastewater Reclamation for Mun. Irrigation	0	0	1,752	3,838	6,787	10,215
SJRA WRAP	0	36,377	55,538	54,582	53,581	52,534
Interim Strategies	13,268	0	0	0	0	0
TRA To SJRA Contract	0	0	0	7,935	39,096	76,476
Total after Recommendations	0	1,037	448	577	15	92
Polk						
Initial Shortage	0	-117	-205	-272	-384	-513
Expanded GW	0	117	205	272	384	513
Municipal Conservation	0	158	173	180	187	198
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	158	173	180	187	198
Total after Recommendations	0	158	173	180	187	198
San Jacinto						
Initial Shortage	0	-300	-533	-695	-793	-869
Expanded GW	0	542	928	984	1,007	1,060
Municipal Conservation	19	148	163	174	181	184
Contract Expansions	0	0	0	0	0	0
Net Shortage	19	390	558	463	395	375
Total after Recommendations	19	390	558	463	395	375

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Trinity						
Initial Shortage	0	0	0	0	0	0
Expanded GW	0	36	36	21	0	0
Municipal Conservation	0	2	1	0	0	0
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	38	37	21	0	0
Total after Recommendations	0	38	37	21	0	0
Walker						
Initial Shortage	0	-815	-1,655	-1,973	-2,384	-2,853
Expanded GW	0	816	1,651	1,963	2,374	2,843
Municipal Conservation	0	68	74	89	90	92
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	69	70	79	80	82
Total after Recommendations	0	69	70	79	80	82
Waller						
Initial Shortage	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Expanded GW	0	1,447	2,231	3,644	5,382	7,431
Municipal Conservation	17	392	497	592	708	849
Contract Expansions	0	0	0	0	0	0
Net Shortage	-65	-87	-212	-343	-2,087	-4,075
Irrigation Conservation	0	0	0	0	6,606	6,606
WHCRWA GRP	65	258	409	566	751	968
Total after Recommendations	0	171	197	223	5,270	3,499

Notes:

[1]Lines for reallocation of existing supplies include only the positive portions of reallocations, as negative portions remove surplusses from some WUGs. Shortage values reflect the sum of all WUG shortages without offsets for other WUG surplusses.

Region H
Table 4A-6: Decadal WMS Summary

WMS	Starting Decade	Project Volume (ac-ft/yr) 2010	2020	2030	2040	2050	2060	WWP Capital Cost ($) 2010	2020	2030	2040	2050	2060	WUG Capital Cost ($) 2010	2020	2030	2040	2050	2060
Conservation Strategies:																			
Industrial Conservation	2010							$0	$0	$0	$0	$0	$0						
Irrigation Conservation	2010	71,275	71,275	71,275	71,275	77,881	77,881	$0	$0	$0	$0	$0	$0	$752,268	$0	$0	$0	$1,153	$4,015
Municipal Conservation	2010	45,605	65,318	75,696	84,503	94,392	105,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contractual Strategies:																			
Expand/Increase Current Contracts	2010	7,750	142,599	100,714	86,446	77,143	66,367	$0	$0	$0	$0	$0	$0			See WUG Contracts			
New Contracts from Existing Supplies	2010	36,847	48,370	58,730	77,694	80,570	83,558	$0	$0	$0	$0	$0	$0			See WUG Contracts			
Reallocation of Existing Supplies	2010							$0	$0	$0	$0	$0	$0			See WUG Contracts			
TRA to SJRA Contract	2040	0	0	0	7,935	39,096	76,476	$0	$0	$0	$302,781,597	$0	$0			See WUG Contracts			
TRA to Houston Contract	2030	0	0	116,738	123,524	123,524	123,524			See Luce Bayou						See WUG Contracts			
WUG-Level Contracts[1]	2010			N/A				$0	$0	$0	$0	$0	$0	$350,454,499	$671,560,117	$367,706,601	$368,720,609	$288,157,583	$343,673,748
WWP Contracts	2010			N/A				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Groundwater Strategies:																			
Expanded Use of Groundwater	2010	0	40,159	62,297	68,916	80,337	90,617	$0	$0	$0	$0	$0	$0	$0	$59,415,362	$40,583,127	$21,583,224	$21,103,733	$23,243,553
Interim Strategies	2010	45,512	0	0	0	0	0	$0	$0	$0	$0	$0	$0	$86,701,535	$0	$0	$0	$0	$0
New Groundwater Wells for Livestock	2020	0	41	41	41	41	41	$0	$0	$0	$0	$0	$0	$0	$18,635	$0	$0	$0	$0
Groundwater Reduction Plans:																			
CHCRWA GRP	2010	2,375	4,146	4,789	4,806	4,806	4,806			See CHCRWA Trans.				$0	$0	$0	$0	$0	$0
COH GRP	2010			TBD						See COH Treatment				$8,836,520	$17,799,888	$12,253,354	$7,276,113	$6,014,466	$6,055,532
City of Missouri City GRP	2010	0	5,182	9,431	13,149	13,149	17,562	$0	$51,260,490	$40,810,500	$0	$0	$0	$0	$2,358,074	$2,025,087	$1,630,399	$544,508	$60,638
Fort Bend MUD 25 GRP	2020 (2013)	0	589	589	589	589	589	$0	$0	$0	$0	$0	$0	$0	$776,145	$0	$0	$0	$0
Fort Bend WCID 2 GRP	2020 (2013)	0	2,296	5,753	5,753	5,753	5,753	$0	$10,631,491	$7,098,683	$7,098,683	$0	$0	$0	$0	$0	$0	$0	$0
NFBWA GRP[2]	2020 (2013)	35,009	61,021	70,363	84,943	96,103	106,402			See NFBWA Trans.				$0	$249,735	$358,017	$87,191	$533,359	$409,761
NHCRWA GRP[2]	2010	34,714	91,167	117,755	99,625	81,126	117,755			See NHCRWA Trans.				$1,780,852	$4,837,262	$2,797,086	$2,909,781	$2,373,851	$3,115,753
Pecan Grove GRP	2020 (2013)	866	866	1,731	1,731	1,731	1,731	$0	$0	$0	$0	$0	$0	$15,960,000	$0	$0	$0	$0	$0
Richmond/Rosenberg GRP	2020 (2013)	7,500	7,500	7,500	7,500	7,500	7,500	$0	$43,205,325	$29,963,475	$29,897,900	$0	$14,153,450	$0	$0	$0	$0	$0	$0
River Plantation GRP	2010	168	368	368	368	368	368	$0	$0	$0	$0	$0	$0	$221,379	$263,547	$0	$0	$0	$0
SJRA WRAP[3]	2020 (2013)	0	36,377	55,538	62,517	92,677	129,010	$0	$380,000,000	$180,000,000	$200,000,000	$140,000,000	$0	$0	$67,254,547	$53,629,599	$33,814,326	$31,902,735	$31,255,646
Sugar Land GRP	2020 (2013)	0	1,587	7,987	8,656	8,915	9,796	$0	$82,825,000	$78,535,049	$0	$0	$0	$0	$1,130,682	$2,868,604	$1,726,810	$574,465	$59,540
WHCRWA GRP[2]	2010	21,678	52,274	66,761	73,196	75,985	78,839			See WHCRWA Trans				$5,832,511	$11,987,019	$5,649,170	$3,774,316	$3,888,105	$4,137,849
Infrastructure Strategies:																			
CHCRWA Transmission Line	2010	2,375	4,146	4,789	4,806	4,806	4,806			TBD				N/A	N/A	N/A	N/A	N/A	N/A
CHCRWA Internal Distribution	2010	2,375	4,146	4,789	4,806	4,806	4,806			TBD				N/A	N/A	N/A	N/A	N/A	N/A
CLCND West Chambers System	2020 (2014)	0	1,700	2,000	2,200	2,500	2,800	$0	$20,380,000	$0	$0	$0	$0			See WUG Contracts			
COH Distribution Expansion	2010			TBD				$0	$229,390,000	$31,650,000	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
COH Treatment Expansion	2010			Varies by decade				$66,895,529	$975,979,521	$446,248,855	$223,261,769	$166,643,243	$166,643,243	N/A	N/A	N/A	N/A	N/A	N/A
Harris County MUD 50 WTP	2020 (2013)	560	560	560	560	588	632	$0	$0	$0	$0	$0	$0	$6,131,600	$0	$0	$0	$0	$0
Huntsville WTP	2010	11,200	11,200	11,200	11,200	11,200	11,200	$61,023,906	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LLWSSSC Surface Water Project	2010	954	954	954	954	954	954	$0	$0	$0	$0	$0	$0	$3,087,974	$0	$0	$0	$0	$0
Luce Bayou Transfer	2020	0	128,259	206,276	207,629	205,171	270,742	$0	$253,916,914	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NFBWA Internal Distribution	2020 (2013)	35,009	61,021	70,363	84,943	96,103	106,402	$74,000,000	$15,000,000	$106,000,000	$10,000,000	$10,000,000	$10,000,000	N/A	N/A	N/A	N/A	N/A	N/A
NFBWA Shared Transmission Line	2020 (2013)	0	21,878	39,405	52,595	62,606	71,876	$0	$14,000,000	$142,000,000	$57,000,000	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2010 Distribution	2010	34,714	34,714	34,714	34,714	34,714	34,714	$153,149,640	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2020 Distribution	2020	0	91,167	91,167	91,167	91,167	91,167	$0	$345,292,192	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2030 Distribution	2030	0	0	117,755	117,755	117,755	117,755	$0	$0	$37,439,584	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2010	2010	34,714	34,714	34,714	34,714	34,714	34,714	$80,690,624	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2020	2020	0	91,167	91,167	91,167	91,167	91,167	$0	$172,558,512	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2030	2030	0	0	117,755	117,755	117,755	117,755	$0	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Pearland SWTP	TBD	6,720	6,720	6,720	13,420	13,420	13,420	$0	$0	$0	$0	$0	$0	$46,500,000	$218,500,000	$0	$0	$0	$0
Sealy GW Treatment Expansion		0	360	360	360	360	888	$0	$0	$0	$0	$0	$0	$0	$6,450,000	$0	$0	$0	$0
WHCRWA Internal Distribution	2010	21,678	52,274	66,761	73,196	75,985	78,839	$135,309,000	$340,470,000	$76,693,000	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
WHCRWA Transmission Line	2010	21,678	52,274	66,761	73,196	75,985	78,839	$45,110,193	$244,974,000	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Reservoir Strategies:																			
Allens Creek Reservoir	2020	0	57,393	55,096	87,781	99,650	99,650	$0	$222,752,400	$0	$0	$0	$0			See WUG Contracts			
Brazoria County Off-channel Reservoir	2060	0	0	0	0	0	24,000	$0	$0	$0	$0	$0	$173,898,602			See WUG Contracts			
Dow Off-channel Reservoir	2020	0	21,800	21,800	21,800	21,800	21,800	$0	$124,468,000	$0	$0	$0	$0			See WUG Contracts			
Fort Bend County Off-channel Reservoir	2050	0	0	0	0	90	45,943	$0	$0	$0	$0	$202,514,788	$0			See WUG Contracts			
GCWA Off-channel Reservoir	2030	0	0	39,500	39,500	39,500	39,500	$0	$0	$197,448,012	$0	$0	$0			See WUG Contracts			
Reuse Strategies:																			
Fulshear Reuse	TBD	0	287	430	430	430	430	$0	$0	$0	$0	$0	$0	$0	$378,189	$188,436	$0	$0	$0
Houston Indirect Reuse	2040	0	0	0	66,420	114,679	128,801	$0	$0	$0	$0	$0	$0	$0	$0	$0	$276,409,030	$239,326,921	$206,086,899
Montgomery MUD 8/9 Indirect Reuse	2016	0	657	816	1,120	1,120	1,120	$0	$0	$0	$0	$0	$0	$0	$7,171,477	$1,743,456	$3,330,754	$0	$0
NHCRWA Indirect Reuse	2040	0	0	0	7,300	16,300	16,300	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,223,510	$34,555,184	$0
Wastewater Reuse for Industry	2060	0	0	0	0	0	67,200	$0	$0	$0	$0	$0	$332,051,761	$0	$0	$0	$0	$0	$0
Wastewater Reclamation for Mun. Irrigation	2030	0	0	7,272	15,425	25,561	36,388	$0	$0	$0	$0	$0	$0	$0	$0	$9,582,558	$10,837,039	$13,363,138	$14,260,514
Permit Strategies:																			
BRA System Operations Permit	2020	0	6,621	18,870	25,350	25,350	25,350			TBD						See WUG Contracts			
Houston Bayous Permit*	2020	0	0	0	0	0	0	$0	$20,956,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Strategies:																			
Brazoria Co. Interruptible Supplies for Irr.	2010	104,977	86,759	64,000	64,000	64,000	64,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Freeport Desalination Plant		0	0	0	0	33,600	33,600	$0	$0	$0	$255,699,000	$0	$0			See WUG Contracts			
Brazos Saltwater Barrier	2030			N/A				$0	$44,470,739	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Alternative Strategies:																			
Sabine to Region H Transfer	2030			N/A - Up to 486,500 ac-ft				$0	$0	$760,813,320	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Little-River Off-Channel Reservoir	2040			N/A - Up to 27,225 ac-ft				$0	$0	$0	$137,356,000	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery Co. MUD 8/9 Brackish Desal	2010			N/A - Up to 2,240 ac-ft				N/A	N/A	N/A	N/A	N/A	N/A	$12,000,000	$0	$0	$0	$0	$0

Region H
Table 4A-7: WMS Supply Allocations by WUG

												Supply Volume (ac-ft)								
WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
ALVIN	H	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	99	208	383	595	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	87	89	89	89	89	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	116	124	129	137	146	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1428	2293	2508	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	753	2781	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	3457	11289	6788	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	410	1471	876	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	123	6420	4547	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	131	274	305	340	379	Y	ALLENS CREEK LAKE/RESERVOIR	GC WCID 1 Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	129	303	164	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	133	68	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	149	212	78	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	117	50	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	744	1750	949	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	308	717	388	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	50	50	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	13628	13628	13771	15415	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	6788	6788	6788	6788	6788	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	208	230	237	241	247	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	3485	3837	3909	3993	4093	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	15	15	15	16	16	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	44720	26791	46813	35606	36711	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1615	0	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	39	65	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	62	104	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	49	44	45	48	51	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	75	92	110	127	143	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	271	386	502	647	796	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	46	76	119	168	217	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	6	13	7	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	3	6	3	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	12	6	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	21	24	28	31	34	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	68	321	321	476	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	2	4	2	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	539	2068	4109	6783	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	47	130	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	82	116	43	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	RICHMOND-ROSENBERG	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	0	81	Y	ALLENS CREEK LAKE/RESERVOIR	Richmond-Rosenberg to WUG Contract
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	RICHMOND-ROSENBERG	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1091	2970	1767	Y	ALLENS CREEK LAKE/RESERVOIR	Richmond-Rosenberg to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	1381	1992	2819	3828	5057	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	162	328	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	426	426	426	426	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	23	61	61	61	61	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	GULF COAST WATER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	0	1950	1950	1950	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	125	354	354	354	354	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	403	668	668	668	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	155	245	245	245	245	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #108	H	BRAZOS	FORT BEND	084118000	08411800007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	141	312	312	312	312	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	186	417	417	417	417	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	543	859	859	859	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	1025	1025	1025	1025	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	197	441	441	441	441	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	144	324	324	324	324	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	117	260	260	260	260	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	253	734	734	734	734	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	2779	2779	2779	2779	2779	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	406	406	406	406	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	623	1292	1292	1292	1292	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MEADOWS	H	SAN JACINTO	FORT BEND	080792000	08079200007910	FORT BEND COUNTY WCID #2	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	447	993	993	993	993	Y	BRA SYSTEM OPERATIONS PERMIT	FB WCID 2 to WUG Contract
MEADOWS	H	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	FORT BEND COUNTY WCID #2	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	44	99	99	99	99	Y	BRA SYSTEM OPERATIONS PERMIT	FB WCID 2 to WUG Contract
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	44	44	44	44	44	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	160	160	160	160	160	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	27	27	27	27	27	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	189	383	383	383	383	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	77	165	165	165	165	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	86	703	717	717	717	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	395	1287	1287	1287	1287	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	480	1079	1079	1079	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	2809	5675	5675	5675	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	4	10	10	10	10	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	87	135	135	135	135	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	318	740	772	772	772	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
SUGAR LAND	H	SAN JACINTO	FORT BEND	080585000	08058500007910	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	35	35	35	35	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	778	1216	1216	1216	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY	H	BRAZOS	BRAZORIA	BIIS12	1804	1434	1293	1207	1157	1157	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY	H	BRAZOS	BRAZORIA	BIIS12	63173	45325	55707	55793	55843	55843	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY - SJB	H	SAN JACINTO-BRAZOS	BRAZORIA	BIISJB11	33212	40000	7000	7000	7000	7000	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY - SJB	H	SAN JACINTO-BRAZOS	BRAZORIA	BIISJB11	6788	0	0	0	0	0	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR12	0	0	0	0	0	20344	Y	BRAZORIA OCR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR12	0	0	0	0	0	3656	Y	BRAZORIA OCR	BRA to WUG Contract
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	42	52	61	69	74	Y	CLCND W Chambers System	CLCND to WUG Contract
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	238	298	353	414	478	Y	CLCND W Chambers System	CLCND to WUG Contract
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	187	180	173	168	166	Y	CLCND W Chambers System	CLCND to WUG Contract
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	101	100	99	97	99	Y	CLCND W Chambers System	CLCND to WUG Contract
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	677	824	955	1090	1230	Y	CLCND W Chambers System	CLCND to WUG Contract
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	268	335	396	462	532	Y	CLCND W Chambers System	CLCND to WUG Contract
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	178	189	198	211	225	Y	CLCND W Chambers System	CLCND to WUG Contract
BLUE BELL MANOR UTILITY COMPANY	H	SAN JACINTO	HARRIS	084026000	08402600010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	140	363	413	407	402	402	Y	COH GRP	COH GRP Participation
EL DORADO UD	H	SAN JACINTO	HARRIS	084101000	08410100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	130	325	403	440	481	526	Y	COH GRP	COH GRP Participation
GREEN TRAILS MUD	H	SAN JACINTO	HARRIS	084143000	08414300010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	224	668	862	973	1087	1204	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #11	H	SAN JACINTO	HARRIS	084153000	08415300010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	102	303	389	437	487	543	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #119 INWOOD NORTH	H	SAN JACINTO	HARRIS	084154000	08415400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	211	588	665	652	644	644	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #153	H	SAN JACINTO	HARRIS	084161000	08416100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	295	1069	1559	1961	2373	2782	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #154	H	SAN JACINTO	HARRIS	084162000	08416200010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	163	532	721	860	995	1141	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #189	H	SAN JACINTO	HARRIS	084174000	08417400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	193	621	838	995	1148	1311	Y	COH GRP	COH GRP Participation
HARRIS COUNTY UD #14	H	SAN JACINTO	HARRIS	084190000	08419000010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	143	409	511	559	609	661	Y	COH GRP	COH GRP Participation
HARRIS COUNTY UD #15	H	SAN JACINTO	HARRIS	084191000	08419100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	104	312	403	455	509	568	Y	COH GRP	COH GRP Participation
HARRIS COUNTY WCID #133	H	SAN JACINTO	HARRIS	084195000	08419500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	181	480	553	546	550	550	Y	COH GRP	COH GRP Participation
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-3762	-11417	-16809	-19870	-22399	-24990	Y	COH GRP	COH GRP Participation
LONGHORN TOWN UD	H	SAN JACINTO	HARRIS	084235000	08423500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	167	574	857	1105	1351	1597	Y	COH GRP	COH GRP Participation
MASON CREEK UD	H	SAN JACINTO	HARRIS	084247000	08424700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	566	1487	1696	1682	1674	1674	Y	COH GRP	COH GRP Participation
NORTH BELT UD	H	SAN JACINTO	HARRIS	084275000	08427500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	112	384	541	666	796	926	Y	COH GRP	COH GRP Participation
NORTH GREEN MUD	H	SAN JACINTO	HARRIS	084279000	08427900010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	84	242	300	321	345	372	Y	COH GRP	COH GRP Participation
NORTHWEST PARK MUD	H	SAN JACINTO	HARRIS	084287000	08428700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	662	2179	2525	2474	2450	2450	Y	COH GRP	COH GRP Participation
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2418	4018	5005	5967	Y	COH GRP	COH GRP Participation
WEST HARRIS COUNTY MUD #6	H	SAN JACINTO	HARRIS	084387000	08438700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	135	360	416	406	401	401	Y	COH GRP	COH GRP Participation
WOODCREEK MUD	H	SAN JACINTO	HARRIS	084404000	08440400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	150	521	739	913	1092	1271	Y	COH GRP	COH GRP Participation
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	THE DOW CHEMICAL CO.	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR12	0	19048	19048	19048	19048	19048	Y	DOW OFFCHANNEL RESERVOIR	DOW to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	THE DOW CHEMICAL CO.	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR12	0	2752	2752	2752	2752	2752	Y	DOW OFFCHANNEL RESERVOIR	DOW to WUG Contract
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	137	98	103	112	160	231	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	465	465	465	465	465	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	106	106	106	106	106	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	1142	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	977	862	720	631	546	Y	EXPAND/INCREASE CURRENT CONTRACTS	CHCRWA to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	794	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	CHCRWA to WUG Contract
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	0	0	24	42	84	144	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	1752	1852	2005	681	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	4730	3837	4313	5198	5355	4546	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	248	248	248	248	248	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	1962	1962	1962	1962	1962	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	449	449	449	449	449	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	469	469	469	469	469	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	107	107	107	107	107	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	0	95	263	439	670	950	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	677	677	677	677	677	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	5360	5360	5360	5360	5360	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	1225	1225	1225	1225	1225	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	213	213	213	213	213	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	1688	1688	1688	1688	1688	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	386	386	386	386	386	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	17	17	17	17	17	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	134	134	134	134	134	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	31	31	31	31	31	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	1718	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	744	708	830	1049	1349	1703	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	326	252	130	124	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612		844	4	6	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	FORT BEND CO. WCID 1	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	FORT BEND	346110517011	0	148	824	940	1016	1016	Y	EXPAND/INCREASE CURRENT CONTRACTS	FB WCID 1 to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	8611	3177	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	444	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	NFBWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	30880	30880	32734	29030	25398	Y	EXPAND/INCREASE CURRENT CONTRACTS	NHCRWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	25573	14181	7419	3616	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	NHCRWA to WUG Contract
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	25	31	42	57	76	100	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	36	33	36	42	56	76	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	117	117	117	117	117	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	930	930	930	930	930	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	213	213	213	213	213	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	967	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	Pasadena to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	3286	3357	4189	5154	6027	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	2842	1459	553	246	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	940	940	940	940	940	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	7444	7444	7444	7444	7444	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	1701	1701	1701	1701	1701	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	465	465	465	465	465	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	106	106	106	106	106	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	219	471	286	209	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	WHCRWA to WUG Contract
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	31618	12123	6225	3861	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	WHCRWA to WUG Contract
AMES	H	TRINITY	LIBERTY	080676000	08067600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	22	42	60	84	113	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	46	58	54	61	71	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAILEY'S PRAIRIE	H	BRAZOS	BRAZORIA	080817000	08081700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAILEY'S PRAIRIE	H	SAN JACINTO-BRAZOS	BRAZORIA	080817000	08081700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	3	5	7	10	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYOU VISTA	H	SAN JACINTO-BRAZOS	GALVESTON	080759000	08075900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	3	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	9	14	18	23	28	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	SAN JACINTO	HARRIS	080042000	08004200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	1	1	1	2	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	1	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	2	3	4	6	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	22	35	44	52	58	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEASLEY	H	BRAZOS	FORT BEND	081012000	08101200007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	1	2	4	6	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEASLEY	H	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	11	24	38	58	82	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	52	104	104	104	104	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BELLVILLE	H	BRAZOS	AUSTIN	080048000	08004800000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	285	472	568	618	697	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #1	H	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	300	650	955	1294	1648	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #2	H	BRAZOS	BRAZORIA	084031000	08403100002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	380	813	1200	1621	2060	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #3	H	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	217	468	687	931	1186	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BROOKSHIRE	H	BRAZOS	WALLER	080077000	08007700023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	124	304	506	754	1050	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BROOKSIDE VILLAGE	H	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	14	39	63	91	124	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BUFFALO	H	TRINITY	LEON	080083000	08008300014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	36	53	49	44	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CENTERVILLE	H	TRINITY	LEON	080105000	08010500014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	14	21	18	16	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEAR BROOK CITY MUD WOODMEADOWS	H	SAN JACINTO	HARRIS	084063000	08406300010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	18	38	38	38	38	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEVELAND	H	SAN JACINTO	LIBERTY	080116000	08011600014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	24	51	75	123	188	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	14	20	32	44	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COLDSPRING	H	SAN JACINTO	SAN JACINTO	080122000	08012200020410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	7	12	15	16	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COLDSPRING	H	TRINITY	SAN JACINTO	080122000	08012200020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	23	42	53	59	62	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	37	359	626	858	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CONSOLIDATED WSC	H	TRINITY	WALKER	084071000	08407100023608	None	YEGUA-JACKSON AQUIFER	H	TRINITY	WALKER	2363108	0	1	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	26	45	53	57	66	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	COLORADO	AUSTIN	080757008	08075700800814	None	GULF COAST AQUIFER	H	COLORADO	AUSTIN	0081514	0	3	5	5	6	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	141	230	279	321	366	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	1804	2457	2514	2437	2356	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	LEON	080757145	08075714514512	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	LEON	1451012	0	21	26	17	10	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	SPARTA AQUIFER	H	TRINITY	LEON	1452708	0	7	8	5	3	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	QUEEN CITY AQUIFER	H	TRINITY	LEON	1452408	0	6	8	5	2	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	7	8	5	3	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	NECHES	LIBERTY	080757146	08075714614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	25	49	74	101	134	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	NECHES-TRINITY	LIBERTY	080757146	08075714614607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	LIBERTY	1461507	0	1	3	5	7	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	LIBERTY	080757146	08075714614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	210	413	624	851	1133	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LIBERTY	080757146	08075714614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	156	463	789	1139	1584	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	LIBERTY	1461509	0	30	60	90	123	163	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	MADISON	080757157	08075715715712	None	SPARTA AQUIFER	H	BRAZOS	MADISON	1572712	0	4	7	9	12	16	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	50	100	57	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	QUEEN CITY AQUIFER	H	TRINITY	MADISON	1572408	0	11	6	4	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	SPARTA AQUIFER	H	TRINITY	MADISON	1572708	0	0	0	8	91	156	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	406	2740	5360	7371	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	POLK	080757187	08075718718708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	71	124	174	260	356	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	SAN JACINTO	080757204	08075720420410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	106	184	223	246	261	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	SAN JACINTO	080757204	08075720420408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	174	268	124	33	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	TRINITY	080757228	08075722822808	None	GULF COAST AQUIFER	H	TRINITY	TRINITY	2281508	0	32	35	21	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	WALKER	080757236	08075723623608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2363108	0	1	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	WALLER	080757237	08075723723712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	0	28	65	136	216	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	WALLER	080757237	08075723723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	172	386	594	888	1219	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CROSBY MUD	H	SAN JACINTO	HARRIS	084078000	08407800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	14	27	27	27	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	8	45	72	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAISETTA	H	NECHES	LIBERTY	080149000	08014900014606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	1	2	3	4	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAISETTA	H	TRINITY	LIBERTY	080149000	08014900014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	2	3	4	7	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DANBURY	H	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	7	14	25	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAYTON	H	TRINITY	LIBERTY	080152000	08015200014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	424	816	1187	1618	2118	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DEER PARK	H	SAN JACINTO	HARRIS	080154000	08015400010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DEER PARK	H	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	1	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	33	50	50	50	50	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	11	38	59	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FLO COMMUNITY WSC	H	TRINITY	LEON	084114000	08411400014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	107	160	156	141	149	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FREEPORT	H	BRAZOS	BRAZORIA	080217000	08021700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	9	23	32	41	49	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	45	150	213	256	291	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FRIENDSWOOD	H	SAN JACINTO-BRAZOS	GALVESTON	080219000	08021900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	28	40	38	40	40	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALVESTON COUNTY MUD #1	H	SAN JACINTO-BRAZOS	GALVESTON	084135000	08413500008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	5	8	8	8	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	3	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARDIN	H	TRINITY	LIBERTY	080878000	08087800014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	19	36	55	75	99	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARDIN WSC	H	TRINITY	LIBERTY	084148000	08414800014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	102	200	298	406	532	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	9	9	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	90	174	174	174	174	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	12	23	23	23	23	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	9	9	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	27	40	40	40	40	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	11	11	11	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HEMPSTEAD	H	BRAZOS	WALLER	080271000	08027100023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	473	1076	1766	2581	3539	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HILLCREST	H	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOLIDAY LAKES	H	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	7398	14308	14308	14308	14308	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	207	339	339	339	339	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO	MONTGOMERY	080285000	08028500017010	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	62	173	305	481	689	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	24	47	47	47	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IOWA COLONY	H	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	3	11	20	29	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	4748	2105	1912	268	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	NECHES	LIBERTY	081004146	08100414614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	12	24	35	47	78	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	0	0	13	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	474	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	9	22	22	22	22	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JAMAICA BEACH	H	SAN JACINTO-BRAZOS	GALVESTON	080886000	08088600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JEWETT	H	BRAZOS	LEON	080887000	08088700014512	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	9	13	13	12	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JEWETT	H	TRINITY	LEON	080887000	08088700014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	26	41	40	37	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KENDLETON	H	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	43	100	173	267	388	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KENEFICK	H	TRINITY	LIBERTY	081033000	08103300014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	18	34	50	68	89	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LA PORTE	H	SAN JACINTO	HARRIS	080346000	08034600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	2	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LA PORTE	H	SAN JACINTO-BRAZOS	HARRIS	080346000	08034600010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	33	71	71	71	71	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	333	473	508	515	521	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	0	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	0	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	None	GULF COAST AQUIFER	H	TRINITY	TRINITY	2281508	0	2	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2361508	0	0	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	77	119	119	119	119	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIBERTY	H	TRINITY	LIBERTY	080356000	08035600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	18	23	34	69	119	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIVESTOCK	H	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	13	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIVESTOCK	H	SAN JACINTO-BRAZOS	GALVESTON	81005084	08100508408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	10	26	26	26	26	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MADISONVILLE	H	TRINITY	MADISON	080382000	08038200015708	None	SPARTA AQUIFER	H	TRINITY	MADISON	1572708	0	34	56	75	100	127	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	11	39	61	82	99	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS	AUSTIN	081001008	08100100800812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	19	36	51	64	85	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS-COLORADO	AUSTIN	081001008	08100100800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	4	7	11	14	18	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	397	1821	2880	3364	3812	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	191	197	189	154	139	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	GALVESTON	081001084	08100108408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	232	604	604	604	604	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	3726	6894	6894	6894	6894	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	486	899	899	899	899	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	528	976	976	976	976	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	QUEEN CITY AQUIFER	H	TRINITY	LEON	1452408	0	0	0	0	0	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	LEON	1451012	0	0	105	234	291	390	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	128	148	145	202	201	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	LIBERTY	081001146	08100114614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	60	121	183	239	288	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LIBERTY	081001146	08100114614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	12	23	35	46	55	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1572408	0	0	0	4	5	5	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	MADISON	1571012	0	0	41	68	61	61	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	29	15	11	41	72	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	SAN JACINTO	081001204	08100120420410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	4	8	12	15	20	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	WALKER	081001236	08100123623610	None	GULF COAST AQUIFER	H	SAN JACINTO	WALKER	2361510	0	92	176	262	337	416	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	WALKER	081001236	08100123623608	None	YEGUA-JACKSON AQUIFER	H	TRINITY	WALKER	2363108	0	627	1324	1515	1817	2155	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS	WALLER	081001237	08100123723712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	2	4	7	8	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	WALLER	081001237	08100123723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	10	19	27	36	44	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	23	25	22	18	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MERCY WSC	H	SAN JACINTO	LIBERTY	084253000	08425300014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	13	25	38	51	67	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MERCY WSC	H	SAN JACINTO	SAN JACINTO	084253000	08425300020410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	66	117	149	166	175	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS	AUSTIN	081003008	08100300800812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	4	7	9	11	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	AUSTIN	081003008	08100300800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	COLORADO	AUSTIN	081003008	08100300800814	None	GULF COAST AQUIFER	H	COLORADO	AUSTIN	0081514	0	1	1	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	133	182	226	243	246	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	35	59	70	74	75	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	0	2	7	8	10	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	CHAMBERS	081003036	08100303603608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	197	305	408	504	581	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	102	26	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	FORT BEND	081003079	08100307907913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	4	4	6	7	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	GALVESTON	081003084	08100308408407	None	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	0	0	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	15	24	24	24	24	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES	LIBERTY	081003146	08100314614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	LIBERTY	081003146	08100314614607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	LIBERTY	1461507	0	0	0	1	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO	LIBERTY	081003146	08100314614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	LIBERTY	081003146	08100314614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	57	109	157	211	268	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY-SAN JACINTO	LIBERTY	081003146	08100314614609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	LIBERTY	1461509	0	10	15	20	25	30	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	POLK	081003187	08100318718708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	2	3	4	5	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	29	56	77	99	121	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	23	38	48	56	62	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	396	513	583	596	587	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	215	473	704	880	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	6	31	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEEDVILLE	H	BRAZOS	FORT BEND	080428000	08042800007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	43	97	152	229	320	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEEDVILLE	H	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	53	118	185	277	387	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	5	55	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEW WAVERLY	H	SAN JACINTO	WALKER	080926000	08092600023610	None	GULF COAST AQUIFER	H	SAN JACINTO	WALKER	2361510	0	17	25	18	17	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	150	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	6440	2725	2725	2725	2725	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	BRAZOS	LEON	080927000	08092700014512	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	4	7	6	5	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	TRINITY	LEON	080927000	08092700014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	11	16	14	13	14	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	TRINITY	MADISON	080927000	08092700015708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	2	3	3	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	0	0	0	1	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ONALASKA	H	TRINITY	POLK	080933000	08093300018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	40	71	92	113	136	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ONALASKA WSC	H	TRINITY	POLK	084293000	08429300018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	4	7	2	6	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ORBIT SYSTEMS INC	H	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	5	12	20	27	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	62	124	185	247	321	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	15	24	27	29	30	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PASADENA	H	SAN JACINTO	HARRIS	080456000	08045600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	145	277	277	277	277	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PASADENA	H	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	CITY OF PASADENA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	40	77	77	77	77	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	421	1142	1692	2074	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	14	27	27	27	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINE ISLAND	H	BRAZOS	WALLER	080938000	08093800023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	29	60	93	137	188	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	14	26	26	26	26	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	8	17	17	17	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PLEAK	H	BRAZOS	FORT BEND	081053000	08105300007912	none	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	63	180	298	457	639	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PLUM GROVE	H	SAN JACINTO	LIBERTY	081054000	08105400014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	35	66	99	136	178	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	48	127	201	257	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
POINT BLANK	H	TRINITY	SAN JACINTO	081056000	08105600020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	11	19	23	26	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PRAIRIE VIEW	H	BRAZOS	WALLER	080485000	08048500023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	82	178	289	429	597	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PRAIRIE VIEW	H	SAN JACINTO	WALLER	080485000	08048500023710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	9	20	32	47	66	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	15	20	21	22	23	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	16	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVERSIDE WSC	H	TRINITY	SAN JACINTO	084323000	08432300020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	29	63	120	152	187	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVERSIDE WSC	H	TRINITY	WALKER	084323000	08432300023608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2361508	0	0	5	49	72	109	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	65	142	198	250	293	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN FELIPE	H	BRAZOS	AUSTIN	080954000	08095400000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	21	35	43	46	52	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN JACINTO WSC	H	TRINITY	SAN JACINTO	084328000	08432800020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	68	122	155	171	181	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	5	5	5	5	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	45	87	87	87	87	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	360	608	725	785	888	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SHEPHERD	H	TRINITY	SAN JACINTO	080746000	08074600020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	54	93	110	123	130	Y	EXPANDED USE OF GW	EXPANDED USE OF GW

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
SHOREACRES	H	SAN JACINTO-BRAZOS	HARRIS	080558000	08055800010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	2	3	3	3	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SIMONTON	H	BRAZOS	FORT BEND	081062000	08106200007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	78	173	232	352	494	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTH HOUSTON	H	SAN JACINTO	HARRIS	080569000	08056900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	21	47	47	47	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	6	10	10	10	10	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHWEST UTILITIES	H	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	1	3	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHWEST UTILITIES	H	SAN JACINTO	LIBERTY	084343000	08434300014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	2	4	6	9	12	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	6	17	25	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	17	37	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	7	15	24	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	401	469	469	469	469	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	2259	2641	2641	2641	2641	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	94	117	117	117	117	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	TRINITY	LIBERTY	081002146	08100214614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	1278	1995	2869	3934	5077	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	TRINITY	LIBERTY	081002146	08100214614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	0	0	0	0	156	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO	MONTGOMERY	081002170	08100217017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	1037	811	728	588	502	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SURFSIDE BEACH	H	BRAZOS	BRAZORIA	080967000	08096700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	11	29	47	66	88	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SWEENY	H	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	0	17	37	68	106	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	4038	2033	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	6	6	6	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
TRINITY	H	TRINITY	TRINITY	080610000	08061000022808	None	UNDIFFERENTIATED AQUIFER	H	TRINITY	TRINITY	2282208	0	2	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
VARNER CREEK UD	H	BRAZOS	BRAZORIA	084370000	08437000002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	45	108	166	228	296	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALKER COUNTY RURAL WSC	H	TRINITY	WALKER	084372000	08437200023608	None	SPARTA AQUIFER	H	TRINITY	WALKER	2362708	0	78	119	119	131	146	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	70	112	146	179	10	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLER	H	SAN JACINTO	WALLER	080629000	08062900023710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	72	156	252	366	501	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLIS	H	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	16	24	29	31	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEBSTER	H	SAN JACINTO-BRAZOS	HARRIS	080635000	08063500010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	68	135	135	135	135	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEST HARDIN WSC	H	NECHES	LIBERTY	084383000	08438300014606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	6	13	18	25	34	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	35	48	48	48	48	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	None	FORT BEND MUD 25 REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	FBM2511	0	589	589	589	589	589	Y	FORT BEND MUD 25 REUSE	FORT BEND MUD 25 REUSE
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	13942	Y	FORT BEND OCR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	1800	Y	FORT BEND OCR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	9339	Y	FORT BEND OCR	BRA to WUG Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	338	Y	FORT BEND OCR	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	140	Y	FORT BEND OCR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	161	Y	FORT BEND OCR	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	103	Y	FORT BEND OCR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	1950	Y	FORT BEND OCR	BRA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	796	Y	FORT BEND OCR	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	16	Y	FORT BEND OCR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	11	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	16	Y	FORT BEND OCR	GCWA to WUG Contract
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	723	Y	FORT BEND OCR	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	3535	Y	FORT BEND OCR	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	88	Y	FORT BEND OCR	Sugar Land to WUG Contract
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	RICHMOND-ROSENBERG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	167	Y	FORT BEND OCR	Richmond-Rosenberg to WUG Contract
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	RICHMOND-ROSENBERG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	90	3630	Y	FORT BEND OCR	Richmond-Rosenberg to WUG Contract
STEAM ELECTRIC POWER	H	BRAZOS	FORT BEND	081002079	08100207907912	NRG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	8500	Y	FORT BEND OCR	NRG to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	673	Y	FORT BEND OCR	Sugar Land to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	FREEPORT DESALINATION PLANT	H	GULF	RESERVOIR	FPDESAL24	0	0	0	0	29116	29116	Y	FREEPORT DESALINATION PLANT	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	FREEPORT DESALINATION PLANT	H	GULF	RESERVOIR	FPDESAL24	0	0	0	0	4484	4484	Y	FREEPORT DESALINATION PLANT	BRA to WUG Contract
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	none	FULSHEAR REUSE	H	BRAZOS	FORT BEND	FURU12	0	172	258	258	258	258	Y	FULSHEAR REUSE	Fulshear Reuse
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	none	FULSHEAR REUSE	H	BRAZOS	FORT BEND	FURU12	0	115	172	172	172	172	Y	FULSHEAR REUSE	Fulshear Reuse
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC11	0	0	37920	37920	37920	37920	Y	GCWA OFFCHANNEL RESERVOIR	GCWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	GULF COAST WATER AUTHORITY	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC11	0	0	1580	1580	1580	1580	Y	GCWA OFFCHANNEL RESERVOIR	GCWA to WUG Contract
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	none	SAN JACINTO RIVER RUN-OF-RIVER	H	SAN JACINTO	HARRIS	346100496410	560	560	560	560	560	560	N	Harris County MUD 50 WTP	Harris County MUD 50 WTP
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	none	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	0	0	0	28	72	N	Harris County MUD 50 WTP	Harris County MUD 50 WTP
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	11372	32445	32445	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	12518	20450	66201	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	14250	16080	16080	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	18130	31629	0	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	8634	12318	12318	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	1516	1757	1757	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
MANUFACTURING	H	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	558	558	558	558	558	Y	INDUSTRIAL CONSERVATION	INDUSTRIAL CONSERVATION
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	32	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	83	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	1870	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	38	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	193	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	3989	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	103	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	36	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	489	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	82	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	282	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	171	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	2835	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	15	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
LIVESTOCK	H	NECHES-TRINITY	GALVESTON	081005084	08100508408407	none	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	14	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	77	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	24916	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MANUFACTURING	H	SAN JACINTO	MONTGOMERY	081001170	08100117017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	469	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	none	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	15	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
MINING	H	SAN JACINTO	MONTGOMERY	081003170	08100317017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	110	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	516	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	43	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	318	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	80	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	143	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	138	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	97	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	82	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	167	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	84	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	266	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	115	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	162	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	114	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	15	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	124	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	323	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	384	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	141	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	93	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	297	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	315	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	43	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	33	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	91	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	14	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	126	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	2803	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	2438	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	96	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	32	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381302012	582	582	582	582	582	582	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS-COLORADO	BRAZORIA	081004020	08100402002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	771	771	771	771	771	771	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381302011	17439	17439	17439	17439	17439	17439	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	None	CONSERVATION	H	NECHES-TRINITY	CHAMBERS	380803607	16981	16981	16981	16981	16981	16981	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY	CHAMBERS	081004036	08100403603608	None	CONSERVATION	H	TRINITY	CHAMBERS	380803608	6677	6677	6677	6677	6677	6677	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	380803609	360	360	360	360	360	360	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS	FORT BEND	081004079	08100407907912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	1757	1757	1757	1757	1651	1388	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS-COLORADO	FORT BEND	081004079	08100407907913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381207913	0	0	0	0	106	369	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	FORT BEND	081004079	08100407907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381207911	3440	3440	3440	3440	3440	3440	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	2392	2392	2392	2392	2392	2392	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES	LIBERTY	081004146	08100414614606	None	CONSERVATION	H	NECHES	LIBERTY	380814606	835	835	835	835	835	835	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES-TRINITY	LIBERTY	081004146	08100414614607	None	CONSERVATION	H	NECHES-TRINITY	LIBERTY	380814607	2088	2088	2088	2088	2088	2088	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO	LIBERTY	081004146	08100414614610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	380814610	209	209	209	209	209	209	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY	LIBERTY	081004146	08100414614608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	13360	13360	13360	13360	13360	13360	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	None	CONSERVATION	H	TRINITY-SAN JACINTO	LIBERTY	380814609	4384	4384	4384	4384	4384	4384	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS	WALLER	081004237	08100423723712	None	CONSERVATION	H	BRAZOS	WALLER	381023712	0	0	0	0	1387	1387	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	0	0	0	5219	5219	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	72	71	72	73	77	80	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	591	577	569	568	571	577	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	SAN JACINTO	SAN JACINTO	084226000	08422600020410	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	63	70	73	75	75	74	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	SAN JACINTO	084226000	08422600020408	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	137	150	159	163	162	158	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	72	68	64	59	54	50	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	19	18	17	16	15	15	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
STEAM ELECTRIC POWER	H	BRAZOS	FORT BEND	081002079	08100207907912	NRG	MILLICAN LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	MLR12	0	0	0	0	0	0	Y	MILLICAN LAKE/RESERVOIR	NRG to WUG Contract
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	157	157	157	157	157	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	662	662	662	662	662	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	2955	2955	2955	2955	2955	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	373	373	373	373	373	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	172	859	929	946	959	Y	MISSOURI CITY GRP	Missouri City GRP Participation
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	26	85	594	778	829	Y	MISSOURI CITY GRP	Missouri City GRP Participation
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	342	390	163	78	50	Y	MISSOURI CITY GRP	Missouri City GRP Participation
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	464	526	210	94	58	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	-514	-1249	-1092	-1024	-1009	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-464	-526	-683	-751	-766	Y	MISSOURI CITY GRP	Missouri City GRP Participation
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-26	-85	-121	-121	-121	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	470	470	470	470	470	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	53	53	53	53	53	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	104	104	104	104	104	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	13	13	13	13	13	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	MONTGOMERY COUNTY GRP REUSE	H	SAN JACINTO	MONTGOMERY	MCGR10	0	332	401	534	534	534	Y	MUD 8 AND 9 REUSE	MUD 8 AND 9 REUSE
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	MONTGOMERY COUNTY GRP REUSE	H	SAN JACINTO	MONTGOMERY	MCGR10	0	325	415	586	586	586	Y	MUD 8 AND 9 REUSE	MUD 8 AND 9 REUSE
ALVIN	H	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	170	218	226	237	252	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
AMES	H	TRINITY	LIBERTY	080676000	08067600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	9	10	11	12	14	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	141	141	142	143	146	152	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ARCOLA	H	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	22	24	26	29	31	35	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAILEY'S PRAIRIE	H	BRAZOS	BRAZORIA	080817000	08081700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	0	0	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	30	66	71	75	80	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	SAN JACINTO	HARRIS	080042000	08004200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	31	63	63	63	64	66	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	None	CONSERVATION	H	TRINITY-SAN JACINTO	HARRIS	3891019	527	1054	1060	1065	1084	1111	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	0	0	0	0	0	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	15	20	24	28	32	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEASLEY	H	BRAZOS	FORT BEND	081012000	08101200007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEASLEY	H	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	5	6	7	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	237	253	270	287	305	325	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BELLVILLE	H	BRAZOS	AUSTIN	080048000	08004800000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	88	99	105	108	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BLUE BELL MANOR UTILITY COMPANY	H	SAN JACINTO	HARRIS	084026000	08402600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	32	31	31	30	30	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BOLIVAR PENINSULAR SUD	H	NECHES-TRINITY	GALVESTON	084027000	08402700008407	None	CONSERVATION	H	NECHES-TRINITY	GALVESTON	380708407	67	72	74	75	75	76	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #1	H	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	72	95	114	135	158	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #2	H	BRAZOS	BRAZORIA	084031000	08403100002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	95	122	147	173	201	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #3	H	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	52	68	82	97	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	26	31	35	39	43	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BROOKSHIRE	H	BRAZOS	WALLER	080077000	08007700023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	50	62	75	90	109	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BROOKSIDE VILLAGE	H	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	16	18	19	21	23	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BUFFALO	H	TRINITY	LEON	080083000	08008300014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	21	22	22	22	22	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	89	88	87	87	87	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	25	29	34	38	43	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CENTERVILLE	H	TRINITY	LEON	080105000	08010500014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	11	12	11	11	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	357	357	357	357	357	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	26	37	37	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	16	16	16	16	16	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLEVELAND	H	SAN JACINTO	LIBERTY	080116000	08011600014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	24	51	75	87	91	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	34	67	80	82	86	90	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COLDSPRING	H	SAN JACINTO	SAN JACINTO	080122000	08012200020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	3	3	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COLDSPRING	H	TRINITY	SAN JACINTO	080122000	08012200020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	10	11	12	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	714	925	1174	1457	1830	2273	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSOLIDATED WSC	H	TRINITY	WALKER	084071000	08407100023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	24	31	39	46	53	61	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	13	14	18	22	28	35	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	None	CONSERVATION	H	BRAZOS-COLORADO	AUSTIN	381300813	0	17	18	19	19	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	COLORADO	AUSTIN	080757008	08075700800814	None	CONSERVATION	H	COLORADO	AUSTIN	381400814	0	2	2	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	7	7	8	8	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	235	249	264	275	290	306	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	559	613	679	734	800	872	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES-TRINITY	CHAMBERS	080757036	08075703603607	None	CONSERVATION	H	NECHES-TRINITY	CHAMBERS	3870367	3	3	3	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	14	13	13	12	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	9	9	8	8	8	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	61	269	536	1068	1701	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	6	5	6	34	106	188	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	28	26	21	228	687	1196	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	823	1890	3350	4892	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	LEON	080757145	08075714514512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	21	23	17	10	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	20	24	15	8	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES	LIBERTY	080757146	08075714614606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	10	11	13	14	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES-TRINITY	LIBERTY	080757146	08075714614607	None	CONSERVATION	H	NECHES-TRINITY	LIBERTY	380714607	0	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	LIBERTY	080757146	08075714614610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	83	95	106	119	135	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	LIBERTY	080757146	08075714614608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	173	191	210	231	257	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	None	CONSERVATION	H	TRINITY-SAN JACINTO	LIBERTY	380914609	0	12	14	15	17	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	MADISON	080757157	08075715715712	None	CONSERVATION	H	BRAZOS	MADISON	381215712	0	4	6	6	7	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	CONSERVATION	H	TRINITY	MADISON	380815708	0	52	53	54	55	57	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	1272	1508	2131	2879	3962	5221	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	POLK	080757187	08075718718708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	91	97	100	104	110	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	SAN JACINTO	080757204	08075720420410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	54	58	61	62	63	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	WALKER	080757236	08075723623608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	1	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	WALLER	080757237	08075723723712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	23	42	44	48	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	WALLER	080757237	08075723723710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	56	68	80	96	115	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CROSBY MUD	H	SAN JACINTO	HARRIS	084078001	08407800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010210	0	0	0	0	0	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	1	2	2	2	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	36	42	56	72	95	121	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	12	13	16	19	24	29	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAISETTA	H	NECHES	LIBERTY	080149000	08014900014606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	1	2	3	3	4	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAISETTA	H	TRINITY	LIBERTY	080149000	08014900014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	2	3	4	5	6	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DANBURY	H	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	11	13	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAYTON	H	TRINITY	LIBERTY	080152000	08015200014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	129	152	174	200	230	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DEER PARK	H	SAN JACINTO	HARRIS	080154000	08015400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	116	206	207	208	213	219	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DEER PARK	H	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	177	316	318	320	326	335	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	196	217	227	230	232	235	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	26	31	41	53	69	88	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EL DORADO UD	H	SAN JACINTO	HARRIS	084101000	08410100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	9	30	32	35	37	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	30	29	28	28	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	29	36	44	54	66	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	85	87	90	93	96	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
FLO COMMUNITY WSC	H	TRINITY	LEON	084114000	08411400014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	31	34	34	33	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	53	53	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #108	H	BRAZOS	FORT BEND	084118000	08411800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	32	32	32	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	46	46	46	46	46	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	71	141	141	141	141	141	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	101	141	191	241	309	387	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	49	49	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	36	36	36	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	27	26	26	26	26	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	43	57	75	93	117	144	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	19	22	24	27	30	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FREEPORT	H	BRAZOS	BRAZORIA	080217000	08021700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	9	8	8	8	8	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	130	150	167	186	208	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	12	15	19	22	28	33	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	10	12	15	18	22	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	78	78	79	79	81	84	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
GREEN TRAILS MUD	H	SAN JACINTO	HARRIS	084143000	08414300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	51	57	64	71	77	84	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	108	118	145	175	218	267	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARDIN	H	TRINITY	LIBERTY	080878000	08087800014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	9	10	11	12	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARDIN WSC	H	TRINITY	LIBERTY	084148000	08414800014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	37	43	48	54	61	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	25	24	23	23	17	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	127	173	172	169	169	169	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	21	24	26	29	32	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #11	H	SAN JACINTO	HARRIS	084153000	08415300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	23	26	29	32	35	38	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #119 INWOOD NORTH	H	SAN JACINTO	HARRIS	084154000	08415400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	52	55	54	52	52	52	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #132	H	SAN JACINTO	HARRIS	084157000	08415700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	105	130	154	178	202	227	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #151	H	SAN JACINTO	HARRIS	084159000	08415900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	76	76	75	75	75	75	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #152	H	SAN JACINTO	HARRIS	084160000	08416000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	47	60	73	86	100	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #153	H	SAN JACINTO	HARRIS	084161000	08416100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	73	99	126	151	177	203	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #154	H	SAN JACINTO	HARRIS	084162000	08416200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	40	49	58	67	75	85	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	7	35	34	34	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #180	H	SAN JACINTO	HARRIS	084170000	08417000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	37	44	51	59	66	74	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #189	H	SAN JACINTO	HARRIS	084174000	08417400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	58	68	77	87	98	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	48	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	84	84	84	83	83	83	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #46	H	SAN JACINTO	HARRIS	084183000	08418300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	50	49	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	39	38	37	37	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	27	44	46	49	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	123	151	178	205	232	261	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	42	45	48	52	55	60	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY UD #14	H	SAN JACINTO	HARRIS	084190000	08419000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	32	35	38	41	44	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY UD #15	H	SAN JACINTO	HARRIS	084191000	08419100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	24	27	30	33	36	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	75	84	93	102	111	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #133	H	SAN JACINTO	HARRIS	084195000	08419500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	45	45	45	44	44	44	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	93	96	98	102	107	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197001	08419700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	85	92	98	105	112	120	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	36	40	43	46	49	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	16	16	16	15	15	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	33	34	34	34	34	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	46	46	45	45	45	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HEMPSTEAD	H	BRAZOS	WALLER	080271000	08027100023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	122	161	204	256	317	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HILLCREST	H	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	1	1	2	5	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HILLSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	10	10	10	10	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOLIDAY LAKES	H	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	0	0	0	0	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	FORT BEND	080285000	08028500007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	3880798	258	296	341	389	454	532	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO-BRAZOS	FORT BEND	080285000	08028500007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	181	208	240	273	319	374	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	22938	25284	27474	29731	32122	34704	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	1278	1409	1531	1657	1790	1934	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	MONTGOMERY	080285000	08028500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	12	13	24	33	45	59	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	232	258	283	308	334	362	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	104	111	118	125	132	139	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
IOWA COLONY	H	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	7	7	7	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	57	92	97	102	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JERSEY VILLAGE	H	SAN JACINTO	HARRIS	080709000	08070900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	112	129	147	164	182	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JEWETT	H	BRAZOS	LEON	080887000	08088700014512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	3	4	4	3	4	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JEWETT	H	TRINITY	LEON	080887000	08088700014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	10	11	11	10	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	FORT BEND	080312000	08031200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	18	24	31	38	47	58	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	HARRIS	080312000	08031200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	203	245	288	332	374	419	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	WALLER	080312000	08031200023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	17	26	35	46	58	73	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	15	18	19	20	20	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KENDLETON	H	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	11	14	18	23	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KENEFICK	H	TRINITY	LIBERTY	081033000	08103300014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	6	7	8	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	255	275	292	310	330	355	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	7	8	8	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	54	62	64	66	70	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	SAN JACINTO	SAN JACINTO	084226000	08422600020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	6	7	8	8	9	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	SAN JACINTO	084226000	08422600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	13	16	17	18	19	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	None	CONSERVATION	H	TRINITY	TRINITY	380822808	0	2	1	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	1	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	474	523	550	555	560	567	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	2	2	2	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LIBERTY	H	TRINITY	LIBERTY	080356000	08035600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	18	23	34	69	97	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LONGHORN TOWN UD	H	SAN JACINTO	HARRIS	084235000	08423500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	12	26	33	41	49	56	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MADISONVILLE	H	TRINITY	MADISON	080382000	08038200015708	None	CONSERVATION	H	TRINITY	MADISON	380815708	0	34	50	51	53	54	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	24	34	44	56	72	91	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	30	30	29	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MASON CREEK UD	H	SAN JACINTO	HARRIS	084247000	08424700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	140	138	137	135	135	135	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MEADOWS	H	SAN JACINTO	FORT BEND	080792000	08079200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	112	111	110	108	108	108	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MEADOWS	H	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	11	11	11	11	11	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MERCY WSC	H	SAN JACINTO	LIBERTY	084253000	08425300014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	5	6	6	7	8	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MERCY WSC	H	SAN JACINTO	SAN JACINTO	084253000	08425300020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	22	25	27	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	25	30	35	38	46	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	203	242	283	313	381	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	917	1096	1280	1417	1723	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	83	98	113	129	146	162	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	37	48	59	67	77	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	17	23	27	32	36	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	14	57	83	109	136	162	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	112	142	210	290	397	520	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	25	25	25	25	25	25	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	50	65	79	83	82	82	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	60	76	83	85	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	31	31	30	30	30	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	29	30	33	37	43	51	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	58	58	57	56	56	56	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	30	31	34	39	45	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEEDVILLE	H	BRAZOS	FORT BEND	080428000	08042800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	0	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEEDVILLE	H	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	18	22	26	31	38	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	69	153	200	252	326	412	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEW WAVERLY	H	SAN JACINTO	WALKER	080926000	08092600023610	None	CONSERVATION	H	SAN JACINTO	WALKER	381023610	0	13	13	13	13	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	115	169	233	331	454	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	0	1686	1882	1934	1922	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	1521	2146	2713	3223	3705	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	57	61	65	69	74	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	6441	7598	8480	8961	9156	9389	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	BRAZOS	LEON	080927000	08092700014512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	3	3	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	TRINITY	LEON	080927000	08092700014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	6	7	7	7	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	TRINITY	MADISON	080927000	08092700015708	None	CONSERVATION	H	TRINITY	MADISON	380815708	1	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTH BELT UD	H	SAN JACINTO	HARRIS	084275000	08427500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	27	36	44	51	60	68	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTH GREEN MUD	H	SAN JACINTO	HARRIS	084279000	08427900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	21	23	24	26	28	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION

Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
NORTHWEST HARRIS COUNTY MUD #23	H	SAN JACINTO	HARRIS	084286000	08428600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	35	43	52	60	69	77	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTHWEST PARK MUD	H	SAN JACINTO	HARRIS	084287000	08428700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	184	217	217	213	211	211	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	41	45	53	64	77	94	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	12	13	14	15	16	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ONALASKA	H	TRINITY	POLK	080933000	08093300018708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	13	14	16	17	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	0	3	4	4	5	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	27	31	34	38	42	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	1	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	9	10	12	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	36	38	39	41	43	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	17	16	16	16	15	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PASADENA	H	SAN JACINTO	HARRIS	080456000	08045600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	1014	1106	1189	1278	1374	1482	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PASADENA	H	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	284	309	333	358	385	415	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	5	5	6	6	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	216	538	631	719	817	920	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	8	18	21	23	26	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PECAN GROVE MUD #1	H	BRAZOS	FORT BEND	084299000	08429900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	115	162	164	166	171	178	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PECAN GROVE MUD #1	H	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	31	43	44	44	45	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINE ISLAND	H	BRAZOS	WALLER	080938000	08093800023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	8	10	12	14	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	56	60	64	68	72	77	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	76	78	81	84	86	90	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	34	33	32	32	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLEAK	H	BRAZOS	FORT BEND	081053000	08105300007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	36	43	50	59	70	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLUM GROVE	H	SAN JACINTO	LIBERTY	081054000	08105400014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	10	11	13	15	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	54	78	105	142	184	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
POINT BLANK	H	TRINITY	SAN JACINTO	081056000	08105600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	5	6	6	6	6	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	123	137	171	212	210	210	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PRAIRIE VIEW	H	BRAZOS	WALLER	080485000	08048500023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	8	9	9	10	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PRAIRIE VIEW	H	SAN JACINTO	WALLER	080485000	08048500023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	72	78	85	93	103	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	146	145	144	144	144	144	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	179	213	245	301	363	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	20	21	22	22	23	24	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	50	49	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVERSIDE WSC	H	TRINITY	SAN JACINTO	084323000	08432300020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	11	13	16	18	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVERSIDE WSC	H	TRINITY	WALKER	084323000	08432300023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	5	23	24	26	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	39	40	42	43	45	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	32	50	71	93	124	160	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	150	497	616	738	904	1101	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SAN FELIPE	H	BRAZOS	AUSTIN	080954000	08095400000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	8	9	9	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	153	182	208	237	264	293	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	97	112	119	123	129	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	104	121	141	162	191	226	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SHEPHERD	H	TRINITY	SAN JACINTO	080746000	08074600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	20	22	23	24	24	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	63	72	72	72	72	72	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SIMONTON	H	BRAZOS	FORT BEND	081062000	08106200007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	0	0	38	45	54	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	121	152	153	158	160	164	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	6	24	25	27	28	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	2	4	5	5	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	42	47	53	57	63	68	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	LIBERTY	084343000	08434300014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	1	1	1	1	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	15	17	21	26	32	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	10	12	16	21	28	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	32	36	48	61	80	101	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	53	55	56	58	60	63	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	4	6	8	11	15	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	54	54	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	625	641	638	638	638	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	SAN JACINTO	FORT BEND	080585000	08058500007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	63	64	64	64	64	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	854	876	872	872	872	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	285	331	375	422	468	517	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SURFSIDE BEACH	H	BRAZOS	BRAZORIA	080967000	08096700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	10	12	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SWEENY	H	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	0	30	40	41	43	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	930	1686	1796	1788	1779	1779	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
TOMBALL	H	SAN JACINTO	HARRIS	080608000	08060800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	166	209	244	306	353	420	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
TRAIL OF THE LAKES MUD	H	SAN JACINTO	HARRIS	084355000	08435500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	87	86	85	85	85	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
VARNER CREEK UD	H	BRAZOS	BRAZORIA	084370000	08437000002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	24	27	31	35	39	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALKER COUNTY RURAL WSC	H	TRINITY	WALKER	084372000	08437200023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	54	55	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	7	9	11	12	14	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLER	H	SAN JACINTO	WALLER	080629000	08062900023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	27	32	37	43	51	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLIS	H	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	None	CONSERVATION	H	BRAZOS-COLORADO	AUSTIN	381300813	0	11	11	11	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST HARDIN WSC	H	NECHES	LIBERTY	084383000	08438300014606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	2	2	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST HARRIS COUNTY MUD #6	H	SAN JACINTO	HARRIS	084387000	08438700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	34	33	33	33	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	197	208	218	228	240	253	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	178	209	241	282	323	363	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	3760	4102	4348	4420	4452	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	34	39	49	61	77	97	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	40	39	38	37	37	37	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	62	60	60	60	60	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	10	11	12	14	16	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WOODCREEK MUD	H	SAN JACINTO	HARRIS	084404000	08440400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	37	49	60	71	82	93	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	BRAZORIA	MNPR12	0	0	0	1	2	2	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS-COLORADO	BRAZORIA	MNPR13	0	0	21	42	64	87	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	BRAZORIA	MNPR11	0	0	95	184	278	376	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	FORT BEND	MNPR12	0	0	460	1072	2286	3714	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS-COLORADO	FORT BEND	080757079	08075707907913	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS-COLORADO	FORT BEND	MNPR13	0	0	14	21	31	34	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	3	66	229	414	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MNPR11	0	0	0	457	1499	2648	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	930	2994	5816	8773	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	HARRIS	MNPR11	0	0	52	7	2	7	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	TRINITY-SAN JACINTO	HARRIS	080757101	08075710110109	none	MUNICIPAL NON-POTABLE REUSE	H	TRINITY-SAN JACINTO	HARRIS	MNPR09	0	0	26	0	0	0	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	MONTGOMERY	MNPR10	0	0	1752	3838	6787	10215	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	FORT BEND	MNPR12	0	0	90	194	356	561	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	474	812	926	929	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MNPR11	0	0	1026	1967	2836	3657	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	0	7	11	11	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	1595	2473	2886	3274	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	69	155	240	320	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	665	1135	1312	1366	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	346080427908	0	0	5299	19014	16041	17533	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	SAN JACINTO RIVER AUTHORITY	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	0	0	0	28	72	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	8264	9230	10252	11284	12240	13445	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	3410805271B08	23008	24777	24777	24777	24777	24777	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	346080427908	0	2977	7014	10986	13959	12467	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MINING	H	TRINITY	CHAMBERS	081003036	08100303603608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	4344	6494	7816	9116	10411	11550	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1215	1359	1904	2488	3081	3677	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MINING	H	NECHES-TRINITY	GALVESTON	081003084	08100308408407	LOWER NECHES VALLEY AUTHORITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	I	NECHES	RESERVOIR	060A006	16	23	26	29	33	37	Y	NEW CONTRACT FROM EXISTING SUPPLY	LNVA to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	2671	1642	0	0	0	Y	NEW CONTRACT FROM EXISTING SUPPLY	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	839	0	0	0	0	Y	NEW CONTRACT FROM EXISTING SUPPLY	COH to WUG Contract
LIVESTOCK	H	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	27	27	27	27	27	Y	NEW GROUNDWATER WELLS FOR LIVESTOCK	New Groundwater Wells for Livestock
LIVESTOCK	H	NECHES-TRINITY	GALVESTON	081005084	08100508408407	none	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	0	14	14	14	14	14	Y	NEW GROUNDWATER WELLS FOR LIVESTOCK	New Groundwater Wells for Livestock
ARCOLA	H	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	106	258	295	345	397	Y	NFBWA GRP	NFBWA GRP Participation
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	76	178	Y	NFBWA GRP	NFBWA GRP Participation
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	45	112	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-45	-112	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-106	-258	-295	-345	-397	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-76	-178	Y	NFBWA GRP	NFBWA GRP Participation
JERSEY VILLAGE	H	SAN JACINTO	HARRIS	080709000	08070900010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	364	767	1043	1315	1600	Y	NHCRWA GRP	NHCRWA GRP Participation
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-761	-2569	-3476	-4530	-5349	-6488	Y	NHCRWA GRP	NHCRWA GRP Participation
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	-364	-767	-1043	-1315	-1600	Y	NHCRWA GRP	NHCRWA GRP Participation
NORTHWEST HARRIS COUNTY MUD #23	H	SAN JACINTO	HARRIS	084286000	08428600010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	141	467	646	770	908	1046	Y	NHCRWA GRP	NHCRWA GRP Participation
TOMBALL	H	SAN JACINTO	HARRIS	080608000	08060800010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	620	2102	2830	3760	4441	5442	Y	NHCRWA GRP	NHCRWA GRP Participation

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	7300	16300	16300	Y	NHCRWA INDIRECT REUSE	NHCRWA INDIRECT REUSE
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	3889	3900	3775	6893	6187	5454	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	2590	2597	2514	4591	4120	3632	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	223	1565	2788	4053	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	145	134	125	223	195	169	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	96	89	83	148	130	112	N	Pearland SWTP	Pearland SWTP
PECAN GROVE MUD #1	H	BRAZOS	FORT BEND	084299000	08429900007912	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	120E012	182	182	363	363	363	363	N	PECAN GROVE GRP	PECAN GROVE GRP
PECAN GROVE MUD #1	H	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	120E012	684	684	1368	1368	1368	1368	N	PECAN GROVE GRP	PECAN GROVE GRP
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	178	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1440	489	496	259	172	467	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	115	354	127	67	45	121	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	478	469	125	56	33	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	110	342	123	66	44	123	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	423	211	132	217	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	10	4	2	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	96	336	131	74	52	173	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	104	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	181	1937	13715	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	203	0	17	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	5	17	7	4	3	9	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	248	270	77	36	22	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	83	250	89	46	30	81	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	22	25	9	5	5	49	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	25	14	1	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	363	266	68	26	15	15	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	103	145	50	29	21	74	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	7	2	1	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	140	495	158	72	42	42	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	341	898	282	129	76	76	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	157	411	126	57	33	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	587	920	335	204	149	574	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	96	140	49	29	21	88	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	BAYTOWN AREA WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	26	71	49	39	196	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	272	313	95	48	32	102	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	190	268	92	54	40	160	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	508	557	163	81	52	115	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	73	187	57	26	15	15	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	199	200	55	25	15	25	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	458	459	125	58	34	40	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HILSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	5	6	2	1	1	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO	FORT BEND	080285000	08028500007910	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-454	-5	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	-17056	-13867	-10665	-22379	-32021	-43418	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	-1197	-1409	-1531	-1657	-1790	-20	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	820	820	879	450	293	707	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	955	1034	302	150	96	210	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	-50	-50	-50	-50	-50	-50	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	-13197	-13197	-13197	-13197	-13197	-13197	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	-447	-447	-447	-447	-447	-447	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	-104	-155	-183	-213	-243	-270	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	-20376	-20600	-20734	-20857	-20975	-21076	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY	CHAMBERS	081004036	08100403603608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	20376	20600	20734	20857	20975	21076	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	-530	-509	-472	-439	-409	-379	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	LIBERTY	081004146	08100414614607	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	-1091	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY	LIBERTY	081004146	08100414614608	CITY OF HOUSTON	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	346080427708	-6657	-6697	-6732	-6767	-6805	-5742	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	CITY OF HOUSTON	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	346080427708	6657	6697	6732	6767	6805	5742	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	1091	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	2	83	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	50	50	50	50	50	50	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	13197	13197	13197	13197	13197	13197	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	447	447	447	447	447	447	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	-67200	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	4487	251	251	2029	1394	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	104	155	183	213	243	270	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	45	509	472	439	409	379	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	140	274	97	56	40	123	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	3	5	2	1	1	3	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	203	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	218	211	220	1872	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1965	1353	909	1466	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	2504	2176	1821	8869	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	199	106	67	80	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	420	11686	55563	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	225	221	58	26	15	17	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	201	294	325	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	4	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	215	266	85	47	33	110	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	697	731	207	100	62	114	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	173	470	152	74	45	76	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1109	484	484	271	188	603	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	3	6	6	5	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	171	509	178	91	59	151	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	213	585	190	90	56	94	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	1229	1068	3909	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	400	400	394	216	152	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	576	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	203	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	231	359	136	80	60	256	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	770	770	1555	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1241	0	0	11748	11748	17886	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	159	417	129	58	34	34	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	126	591	185	84	49	49	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	None	RIVER PLANTATION REUSE	H	SAN JACINTO	MONTGOMERY	RPRU10	168	368	368	368	368	368	Y	RIVER PLANTATION GRP REUSE	RIVER PLANTATION GRP REUSE
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	360	360	360	360	888	N	SEALY GW TREATMENT EXPANSION	SEALY GW TREATMENT EXPANSION
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	-7593	-8219	-9004	-9249	-9456	Y	SJRA WRAP	Supplies
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	12849	16769	15216	13490	12274	Y	SJRA WRAP	SJRA WRAP Participation
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	89	143	204	291	395	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	10308	16122	19183	13789	5335	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	375	4087	12079	17836	Y	SJRA WRAP	SJRA WRAP Participation
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	257	439	663	982	1371	Y	SJRA WRAP	SJRA WRAP Participation
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-127	-136	-138	-139	Y	SJRA WRAP	Supplies
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	86	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	261	233	203	183	Y	SJRA WRAP	SJRA WRAP Participation
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-326	-372	-399	-418	Y	SJRA WRAP	Supplies
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	203	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	670	635	586	547	Y	SJRA WRAP	SJRA WRAP Participation
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1012	-1083	-1099	-1107	Y	SJRA WRAP	Supplies
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	672	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2067	1833	1605	1441	Y	SJRA WRAP	SJRA WRAP Participation
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	221	380	561	812	1118	Y	SJRA WRAP	SJRA WRAP Participation
MANUFACTURING	H	SAN JACINTO	MONTGOMERY	081001170	08100117017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	988	1384	1756	2129	2504	Y	SJRA WRAP	SJRA WRAP Participation
MINING	H	SAN JACINTO	MONTGOMERY	081003170	08100317017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	216	279	331	382	425	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	-787	-777	Y	SJRA WRAP	Supplies
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	374	710	1087	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	0	1151	1011	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-1909	-2136	-2308	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	865	1655	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	3236	3122	3000	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-199	-173	-141	-115	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	167	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	410	296	209	153	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-546	-441	-358	Y	SJRA WRAP	Supplies

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	16	160	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	51	63	583	407	295	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-589	-488	-404	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	19	171	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	51	64	633	453	335	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	203	259	298	337	369	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-245	-232	-222	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	184	264	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	418	342	292	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-369	-300	-245	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	353	452	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	630	445	326	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	189	272	358	470	600	Y	SJRA WRAP	SJRA WRAP Participation
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	546	944	1396	2058	2854	Y	SJRA WRAP	SJRA WRAP Participation
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-398	-418	-414	-414	Y	SJRA WRAP	Supplies
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	272	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	816	709	609	541	Y	SJRA WRAP	SJRA WRAP Participation
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-315	-290	-247	-211	Y	SJRA WRAP	Supplies
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	251	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	649	496	366	280	Y	SJRA WRAP	SJRA WRAP Participation
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	32	47	64	84	113	Y	SJRA WRAP	SJRA WRAP Participation
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	331	613	966	1472	2091	Y	SJRA WRAP	SJRA WRAP Participation
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	777	1260	1826	2047	2239	Y	SJRA WRAP	SJRA WRAP Participation
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1005	-884	-719	-587	Y	SJRA WRAP	Supplies
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	826	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2055	1501	1060	776	Y	SJRA WRAP	SJRA WRAP Participation
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	0	0	Y	SJRA WRAP	Supplies
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	306	561	860	1283	1809	Y	SJRA WRAP	SJRA WRAP Participation
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1046	-1064	-1025	-996	Y	SJRA WRAP	Supplies
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	737	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2144	1808	1504	1304	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1072	-974	-804	-673	Y	SJRA WRAP	Supplies
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	866	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2190	1650	1179	884	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	102	166	237	336	457	Y	SJRA WRAP	SJRA WRAP Participation
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	83	141	212	313	435	Y	SJRA WRAP	SJRA WRAP Participation
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-355	-401	-428	-447	Y	SJRA WRAP	Supplies
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	224	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	727	681	626	583	Y	SJRA WRAP	SJRA WRAP Participation
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	39	68	107	165	249	Y	SJRA WRAP	SJRA WRAP Participation
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-348	-284	-231	Y	SJRA WRAP	Supplies
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	329	423	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	593	419	307	Y	SJRA WRAP	SJRA WRAP Participation
STEAM ELECTRIC POWER	H	SAN JACINTO	MONTGOMERY	081002170	08100217017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	1593	4307	Y	SJRA WRAP	SJRA WRAP Participation
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	-13848	-12584	-11041	-8974	-7359	Y	SJRA WRAP	Supplies
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	23426	25536	18663	13118	9607	Y	SJRA WRAP	SJRA WRAP Participation
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-362	-401	-415	-429	Y	SJRA WRAP	Supplies
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	236	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	742	681	608	559	Y	SJRA WRAP	SJRA WRAP Participation
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	74	107	138	177	225	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	102	919	1293	1291	1183	Y	SUGAR LAND GRP	Sugar Land GRP Participation
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	29	60	536	814	814	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	80	278	127	64	37	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	64	107	102	51	29	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	69	115	108	54	31	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	50	74	80	40	23	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	40	51	63	32	18	Y	SUGAR LAND GRP	Sugar Land GRP Participation
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	46	159	71	35	20	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	-405	-1544	-1773	-1532	-1321	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-147	-338	-812	-974	-913	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	SUGAR LAND	SUGAR LAND GRP REUSE	H	BRAZOS	FORT BEND	SLGR12	0	560	5040	5040	5040	5040	Y	SUGAR LAND GRP Reuse	SUGAR LAND GRP Reuse
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1327	1841	2179	2179	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	339	479	570	570	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	335	399	415	415	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	331	470	561	561	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1129	1500	1668	1668	Y	TRA TO HOUSTON CONTRACT	CHCRWA to WUG Contract
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	27	27	118	118	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	352	522	661	661	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	2155	2155	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	47	47	47	47	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	17	26	32	32	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	206	258	276	276	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	237	326	384	384	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	24	35	66	66	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	3	3	3	3	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	182	187	196	196	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	134	207	260	260	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	18	18	18	18	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	423	513	537	537	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	756	916	959	959	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	339	402	415	415	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	896	1448	1880	1880	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	130	205	271	271	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	BAYTOWN AREA WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	191	349	496	496	Y	TRA TO HOUSTON CONTRACT	BAWA to WUG Contract
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	254	341	411	411	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	246	384	500	500	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	437	578	657	657	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	154	183	189	189	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	146	176	191	191	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	336	409	431	431	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HILSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	15	17	18	18	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	2355	3196	3708	3708	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	809	1068	1216	1216	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	25	25	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS		081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	9181	9181	9181	9181	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	261	399	506	506	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	5	8	9	9	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	584	1500	2782	2782	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	5261	9610	11492	11492	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	6707	15453	23033	23033	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	533	752	848	848	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	37980	24338	2080	2080	Y	TRA TO HOUSTON CONTRACT	NHCRWA to WUG Contract
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	156	184	190	190	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	227	332	411	411	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	556	710	788	788	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	408	515	565	565	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1298	1929	2384	2384	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	17	39	67	67	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	475	645	752	752	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	509	642	703	703	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	4396	4396	4396	4396	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1055	1055	1055	1055	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	363	568	759	759	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1261	1261	1872	1872	Y	TRA TO HOUSTON CONTRACT	WHCRWA to WUG Contract
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	32469	32469	37089	37089	Y	TRA TO HOUSTON CONTRACT	WHCRWA to WUG Contract
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	345	412	425	425	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	496	596	624	624	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	2165	9786	17812	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	537	8580	25585	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	33	147	265	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	91	426	794	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	261	1164	2091	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	835	1467	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	461	2265	4354	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	42	152	222	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	149	361	493	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	160	400	558	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	60	248	423	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	90	322	473	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	101	442	784	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	71	265	406	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	214	769	1127	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	76	272	398	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	258	1091	1892	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	235	856	1282	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	97	455	846	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	84	304	445	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	2653	9514	13948	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	97	442	811	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	CITY OF HOUSTON	WASTEWATER REUSE FOR INDUSTRY	H	SAN JACINTO	HARRIS	361010110	0	0	0	0	0	67200	Y	WASTEWATER REUSE FOR INDUSTRY	INDUSTRY
HARRIS COUNTY MUD #132	H	SAN JACINTO	HARRIS	084157000	08415700010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	421	1393	1909	2292	2667	3058	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #151	H	SAN JACINTO	HARRIS	084159000	08415900010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	306	811	932	925	925	925	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #152	H	SAN JACINTO	HARRIS	084160000	08416000010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	189	650	909	1112	1324	1536	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #180	H	SAN JACINTO	HARRIS	084170000	08417000010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	148	475	640	758	874	998	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #46	H	SAN JACINTO	HARRIS	084183000	08418300010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	201	526	598	593	593	593	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	FORT BEND	080312000	08031200007910	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	FORT BEND	0791510	68	238	356	462	601	764	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	HARRIS	080312000	08031200010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	756	2462	3347	3989	4619	5276	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	WALLER	080312000	08031200023710	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	65	258	409	566	751	968	Y	WHCRWA GRP	WHCRWA GRP Participation
TRAIL OF THE LAKES MUD	H	SAN JACINTO	HARRIS	084355000	08435500010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	334	876	1005	986	986	986	Y	WHCRWA GRP	WHCRWA GRP Participation
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	FORT BEND	0791510	-68	-238	-356	-462	-601	-764	Y	WHCRWA GRP	WHCRWA GRP Participation
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-2420	-7451	-9749	-11221	-12739	-14340	Y	WHCRWA GRP	WHCRWA GRP Participation

Region H
Table 4A-8: WUG-Level Contracts

Note- includes GRP/WRAP participation, reuse supplies with a listed WWP, expanded GW with a listed WWP, and interruptible irrigation supplies.

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
BAYTOWN AREA WATER AUTHORITY	15	HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	08419300010110	0	26	262	398	535	692
WWP Total						**0**	**26**	**262**	**398**	**535**	**692**
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	SAN JACINTO	FORT BEND	08075707907910	0	23	61	471	1,532	2,737
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	0	0	123	6,420	13,886
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	0	426	3,883	11,715	21,156
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	0	0	1,615	4,484	8,140
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	0	47,499	29,570	49,592	67,501	88,950
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	SAN JACINTO	FORT BEND	08100107907910	0	623	1,292	1,354	1,396	1,297
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	BRAZOS	FORT BEND	08100107907912	0	0	406	445	471	422
BRAZOS RIVER AUTHORITY	331	MINING	SAN JACINTO-BRAZOS	BRAZORIA	08100302002011	0	73	103	146	195	244
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS	BRAZORIA	08100302002012	0	119	136	154	171	187
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS-COLORADO	BRAZORIA	08100302002013	0	431	546	662	807	956
BRAZOS RIVER AUTHORITY	331	MINING	SAN JACINTO	FORT BEND	08100307907910	0	77	165	168	171	173
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS	FORT BEND	08100307907912	0	189	383	389	396	401
BRAZOS RIVER AUTHORITY	331	FAIRCHILDS	BRAZOS	FORT BEND	08101900007912	0	125	354	483	657	856
BRAZOS RIVER AUTHORITY	331	FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	08412200007911	0	0	1,025	1,769	2,775	3,924
BRAZOS RIVER AUTHORITY	331	FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	08412900007912	0	253	734	1,042	1,451	1,918
BRAZOS RIVER AUTHORITY	331	ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	08429400007911	0	4	10	12	14	17
WWP Total						**0**	**49,416**	**35,211**	**62,308**	**100,156**	**145,264**
BRAZOSPORT WATER AUTHORITY	2000	ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	08001800002011	137	98	103	112	160	231
BRAZOSPORT WATER AUTHORITY	2000	CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	08011800002011	0	0	24	42	84	144
BRAZOSPORT WATER AUTHORITY	2000	FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	08021700002011	0	95	263	439	670	950
BRAZOSPORT WATER AUTHORITY	2000	LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	08033800002011	744	708	830	1,049	1,349	1,703
BRAZOSPORT WATER AUTHORITY	2000	RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	08050100002011	36	33	36	42	56	76
BRAZOSPORT WATER AUTHORITY	2000	OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	08073000002011	25	31	42	57	76	100
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	08075702002011	4,730	3,837	4,313	5,198	6,108	7,327
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	BRAZOS	BRAZORIA	08075702002012	0	116	124	129	137	146
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	08075702002013	1,752	1,852	2,005	2,109	2,293	2,508
BRAZOSPORT WATER AUTHORITY	2000	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	844	4	6	0	0
BRAZOSPORT WATER AUTHORITY	2000	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	326	252	130	124	0	0
WWP Total						**7,750**	**7,866**	**7,874**	**9,307**	**10,933**	**13,185**
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	MONT BELVIEU	TRINITY	CHAMBERS	08041300003608	0	677	824	955	1,090	1,230
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	08041300003609	0	268	335	396	462	532
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	OLD RIVER-WINFREE	TRINITY	CHAMBERS	08072700003608	0	178	189	198	211	225
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	COUNTY-OTHER	TRINITY	CHAMBERS	08075703603608	0	187	180	173	168	166
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	08075703603609	0	101	100	99	97	99
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	BEACH CITY	TRINITY	CHAMBERS	08082200003608	0	42	52	61	69	74
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	08082200003609	0	238	298	353	414	478
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	IRRIGATION	NECHES-TRINITY	CHAMBERS	08100403603607	0	0	0	0	0	0
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	IRRIGATION	TRINITY	CHAMBERS	08100403603608	20,376	20,600	20,734	20,857	20,975	21,076
WWP Total						**20,376**	**22,291**	**22,712**	**23,092**	**23,486**	**23,880**
CHCRWA	999902	CHCRWA	SAN JACINTO	HARRIS	CHCRWA10110	0	1,771	2,414	2,431	2,431	2,431
WWP Total						**0**	**1,771**	**2,414**	**2,431**	**2,431**	**2,431**
CITY OF GALVESTON	316200	GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	08022700008411	0	7,262	7,262	7,262	7,262	7,262
WWP Total						**0**	**7,262**	**7,262**	**7,262**	**7,262**	**7,262**
CITY OF HOUSTON	396200	BELLAIRE	SAN JACINTO	HARRIS	08004600010110	1,440	1,631	1,823	2,100	2,351	2,646
CITY OF HOUSTON	396200	BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	08008500010110	478	469	460	455	448	448
CITY OF HOUSTON	396200	GALENA PARK	SAN JACINTO	HARRIS	08022600010110	22	25	33	40	71	115
CITY OF HOUSTON	396200	HEDWIG VILLAGE	SAN JACINTO	HARRIS	08026900010110	458	459	461	467	465	471
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	FORT BEND	08028500007910	0	0	0	0	0	0
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	HARRIS	08028500010110	0	0	0	0	0	12,101
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO-BRAZOS	HARRIS	08028500010111	0	0	0	0	0	319
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	MONTGOMERY	08028500017010	0	62	173	305	481	689
CITY OF HOUSTON	396200	HUMBLE	SAN JACINTO	HARRIS	08028900010110	820	2,538	3,234	3,646	4,001	4,415
CITY OF HOUSTON	396200	HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	08029000010110	955	1,034	1,111	1,218	1,312	1,426
CITY OF HOUSTON	396200	JACINTO CITY	SAN JACINTO	HARRIS	08030100010110	0	0	0	0	27	108
CITY OF HOUSTON	396200	PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	0	0	201	294	325	0
CITY OF HOUSTON	396200	PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	0	0	0	0	4	0
CITY OF HOUSTON	396200	PINEY POINT VILLAGE	SAN JACINTO	HARRIS	08046800010110	697	731	763	810	850	902
CITY OF HOUSTON	396200	SOUTHSIDE PLACE	SAN JACINTO	HARRIS	08057200010110	0	3	23	45	72	100
CITY OF HOUSTON	396200	SPRING VALLEY	SAN JACINTO	HARRIS	08057500010110	213	585	699	732	759	797
CITY OF HOUSTON	396200	WALLER	SAN JACINTO	HARRIS	08062900010110	0	0	0	0	0	203
CITY OF HOUSTON	396200	WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	08064300010110	231	359	499	648	819	1,015
CITY OF HOUSTON	396200	COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	0	0	0	11,553	36,537	48,315
CITY OF HOUSTON	396200	COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	08075710110111	203	0	64	47	47	47
CITY OF HOUSTON	396200	MANUFACTURING	SAN JACINTO	HARRIS	08100110110110	0	0	0	0	0	0

Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
CITY OF HOUSTON	396200	MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	08100110110111	4,487	8,862	12,609	25,460	26,655	25,261
CITY OF HOUSTON	396200	STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	08100210110110	0	5,957	9,395	18,448	22,936	26,650
CITY OF HOUSTON	396200	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	08100210110111	400	1,239	1,449	2,787	2,964	2,812
CITY OF HOUSTON	396200	MINING	SAN JACINTO	HARRIS	08100310110110	140	274	358	455	546	629
CITY OF HOUSTON	396200	MINING	SAN JACINTO-BRAZOS	HARRIS	08100310110111	3	5	7	9	10	12
CITY OF HOUSTON	396200	IRRIGATION	TRINITY	LIBERTY	08100414614608	0	0	0	0	0	0
CITY OF HOUSTON	396200	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	6,657	6,697	6,732	6,767	6,805	5,742
CITY OF HOUSTON	396200	HILSHIRE VILLAGE	SAN JACINTO	HARRIS	08102500010110	0	5	21	19	19	19
CITY OF HOUSTON	396200	BLUE BELL MANOR UTILITY COMPAN	SAN JACINTO	HARRIS	08402600010110	140	363	413	407	402	402
CITY OF HOUSTON	396200	BRITMOORE UTILITIES	SAN JACINTO	HARRIS	08403600010110	115	354	466	546	615	691
CITY OF HOUSTON	396200	CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	08404300010110	110	342	454	536	605	684
CITY OF HOUSTON	396200	CHIMNEY HILL MUD	SAN JACINTO	HARRIS	08405300010110	0	0	37	31	120	118
CITY OF HOUSTON	396200	CONSUMERS WATER INC	SAN JACINTO	HARRIS	08407200010110	96	336	483	596	713	834
CITY OF HOUSTON	396200	CRYSTAL SPRNGS WATER COMPAN	SAN JACINTO	HARRIS	08408100010110	5	17	24	30	35	41
CITY OF HOUSTON	396200	EL DORADO UD	SAN JACINTO	HARRIS	08410100010110	130	325	403	440	481	526
CITY OF HOUSTON	396200	FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	08413200010110	83	250	326	372	414	465
CITY OF HOUSTON	396200	GREEN TRAILS MUD	SAN JACINTO	HARRIS	08414300010110	224	668	862	973	1,087	1,204
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	08415300010110	102	303	389	437	487	543
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #119 INWOOD	SAN JACINTO	HARRIS	08415400010110	211	588	665	652	644	644
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	08416100010110	295	1,069	1,559	1,961	2,373	2,782
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	08416200010110	163	532	721	860	995	1,141
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	08416500010110	0	0	25	20	19	18
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	08417400010110	193	621	838	995	1,148	1,311
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	08417900010110	140	495	581	585	579	579
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	08418200010110	341	898	1,038	1,045	1,035	1,035
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	08418400010110	157	411	465	459	448	448
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	08418900010110	96	140	179	234	292	359
CITY OF HOUSTON	396200	HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	08419000010110	143	409	511	559	609	661
CITY OF HOUSTON	396200	HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	08419100010110	104	312	403	455	509	568
CITY OF HOUSTON	396200	HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	08419500010110	181	480	553	546	550	550
CITY OF HOUSTON	396200	HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	08419900010110	73	187	211	209	204	204
CITY OF HOUSTON	396200	LONGHORN TOWN UD	SAN JACINTO	HARRIS	08423500010110	167	574	857	1,105	1,351	1,597
CITY OF HOUSTON	396200	MASON CREEK UD	SAN JACINTO	HARRIS	08424700010110	566	1,487	1,696	1,682	1,674	1,674
CITY OF HOUSTON	396200	NORTH BELT UD	SAN JACINTO	HARRIS	08427500010110	112	384	541	666	796	926
CITY OF HOUSTON	396200	NORTH GREEN MUD	SAN JACINTO	HARRIS	08427900010110	84	242	300	321	345	372
CITY OF HOUSTON	396200	NORTHWEST PARK MUD	SAN JACINTO	HARRIS	08428700010110	662	2,179	2,525	2,474	2,450	2,450
CITY OF HOUSTON	396200	PARKWAY UD	SAN JACINTO	HARRIS	08429800010110	225	221	214	210	205	207
CITY OF HOUSTON	396200	SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	08434300010110	171	509	653	736	811	903
CITY OF HOUSTON	396200	SUNBELT FWSD	SAN JACINTO	HARRIS	08435000010110	576	2,842	3,877	4,571	5,251	5,967
CITY OF HOUSTON	396200	WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	08438700010110	135	360	416	406	401	401
CITY OF HOUSTON	396200	WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	08439800010110	159	417	474	470	459	459
CITY OF HOUSTON	396200	WINDFERN FOREST UD	SAN JACINTO	HARRIS	08440100010110	126	591	681	680	673	673
CITY OF HOUSTON	396200	WOODCREEK MUD	SAN JACINTO	HARRIS	08440400010110	150	521	739	913	1,092	1,271
CITY OF HOUSTON	396200	ROLLING FORK PUD	SAN JACINTO	HARRIS	08441100010110	173	470	560	589	610	641
WWP Total						**23,612**	**50,832**	**65,254**	**104,076**	**138,986**	**168,591**
CITY OF PASADENA	651900	PASADENA	SAN JACINTO-BRAZOS	HARRIS	08045600010111	0	40	77	77	77	77
CITY OF PASADENA	651900	EL LAGO	SAN JACINTO-BRAZOS	HARRIS	08069500010111	248	270	283	294	298	309
CITY OF PASADENA	651900	HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	08419800010110	508	557	600	659	709	772
CITY OF PASADENA	651900	SEABROOK	SAN JACINTO-BRAZOS	HARRIS	08054500010111	1,109	1,451	1,782	2,200	2,572	2,987
WWP Total						**1,865**	**2,318**	**2,742**	**3,230**	**3,656**	**4,145**
FORT BEND CO. WCID 1	380	MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	08100107907911	0	148	824	940	1,016	1,016
WWP Total						**0**	**148**	**824**	**940**	**1,016**	**1,016**
FORT BEND COUNTY WCID #2	821000	MEADOWS	SAN JACINTO	FORT BEND	08079200007910	0	447	993	993	993	993
FORT BEND COUNTY WCID #2	821000	MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	08079200007911	0	44	99	99	99	99
WWP Total						**0**	**491**	**1,092**	**1,092**	**1,092**	**1,092**
GALVESTON COUNTY WCID #1	316325	DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	08016500008411	0	799	959	990	1,025	1,064
WWP Total						**0**	**799**	**959**	**990**	**1,025**	**1,064**
GULF COAST WATER AUTHORITY	325	ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	08001300002011	0	0	99	208	383	595
GULF COAST WATER AUTHORITY	325	HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	08027900008411	0	182	182	182	182	182
GULF COAST WATER AUTHORITY	325	KEMAH	SAN JACINTO-BRAZOS	GALVESTON	08031600008411	0	208	230	237	241	247
GULF COAST WATER AUTHORITY	325	LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	08035000008411	0	3,485	3,837	3,909	3,993	4,093
GULF COAST WATER AUTHORITY	325	LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	08035000010111	0	15	15	15	16	16
GULF COAST WATER AUTHORITY	325	PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	0	0	539	2,068	4,109	6,783
GULF COAST WATER AUTHORITY	325	PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	0	0	0	0	47	130
GULF COAST WATER AUTHORITY	325	TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	08060200008411	0	10,085	10,085	10,085	10,085	10,085
GULF COAST WATER AUTHORITY	325	MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	08072100002011	0	49	44	45	48	51
GULF COAST WATER AUTHORITY	325	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	0	0	1,950	1,950	1,950
GULF COAST WATER AUTHORITY	325	COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	08075708408411	0	2,659	2,659	2,659	2,659	2,659
GULF COAST WATER AUTHORITY	325	CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	08076400008411	0	87	89	89	89	89
GULF COAST WATER AUTHORITY	325	TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	08097300008411	0	630	630	630	630	630

Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
GULF COAST WATER AUTHORITY	325	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	0	1,580	1,580	1,580	1,580
GULF COAST WATER AUTHORITY	325	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	13,694	13,694	51,614	51,614	51,614	51,614
GULF COAST WATER AUTHORITY	325	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	08100208408411	0	1,381	1,992	2,819	3,828	5,057
GULF COAST WATER AUTHORITY	325	MINING	SAN JACINTO-BRAZOS	FORT BEND	08100307907911	0	86	703	717	729	739
GULF COAST WATER AUTHORITY	325	MINING	SAN JACINTO-BRAZOS	GALVESTON	08100308408411	0	21	24	28	31	34
GULF COAST WATER AUTHORITY	325	IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	08100402002011	82,741	71,681	62,691	62,777	62,970	64,614
GULF COAST WATER AUTHORITY	325	IRRIGATION	BRAZOS	BRAZORIA	08100402002012	1,754	1,384	1,243	1,157	1,157	1,157
GULF COAST WATER AUTHORITY	325	IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	08100408408411	6,788	6,788	6,788	6,788	6,788	6,788
GULF COAST WATER AUTHORITY	325	BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	08401200008411	0	630	630	630	630	630
GULF COAST WATER AUTHORITY	325	GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	08413600008411	0	2,287	2,287	2,287	2,287	2,287
GULF COAST WATER AUTHORITY	325	SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	08432900008411	0	1,260	1,260	1,260	1,260	1,260
WWP Total						**104,977**	**116,612**	**149,221**	**153,734**	**157,306**	**163,270**
LOWER NECHES VALLEY AUTHORITY	140	MINING	NECHES-TRINITY	GALVESTON	08100308408407	16	23	26	29	33	37
WWP Total						**16**	**23**	**26**	**29**	**33**	**37**
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO	FORT BEND	08040900007910	0	715	1,195	1,794	1,794	2,517
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	08040900007911	0	2,595	5,342	8,051	7,983	11,503
MISSOURI CITY	999903	MISSOURI CITY	BRAZOS	FORT BEND	08040900007912	0	508	665	822	890	905
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO	HARRIS	08040900010110	0	386	454	707	707	862
MISSOURI CITY	999903	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	26	85	594	778	829
MISSOURI CITY	999903	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	172	859	929	946	959
MISSOURI CITY	999903	FIRST COLONY MUD #9	BRAZOS	FORT BEND	08411300007912	0	342	793	831	879	926
MISSOURI CITY	999903	FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	08412100007911	0	464	1,069	1,069	1,070	1,070
MISSOURI CITY	999903	SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	08433400007911	0	292	655	651	651	651
WWP Total						**0**	**5,500**	**11,117**	**15,448**	**15,698**	**20,222**
NFBWA	999901	FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	08086900007911	0	0	0	0	45	112
NFBWA	999901	FULSHEAR	BRAZOS	FORT BEND	08086900007912	0	0	0	0	76	178
NFBWA	999901	ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	08099800007911	0	106	258	295	345	397
NFBWA	999901	NFBWA	SAN JACINTO	FORT BEND	NFBWA07910	0	0	7,700	11,775	13,327	13,887
NFBWA	999901	NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA07911	0	6,334	12,704	22,026	29,994	37,709
NFBWA	999901	NFBWA	BRAZOS	FORT BEND	NFBWA07912	0	150	892	1,905	3,313	5,103
NFBWA	999901	NFBWA	SAN JACINTO	HARRIS	NFBWA10110	0	444	732	865	926	939
WWP Total						**0**	**7,034**	**22,286**	**36,866**	**48,026**	**58,325**
NHCRWA	999904	TOMBALL	SAN JACINTO	HARRIS	08060800010110	620	2,102	2,830	3,760	4,441	5,442
NHCRWA	999904	JERSEY VILLAGE	SAN JACINTO	HARRIS	08070900010110	0	364	767	1,043	1,315	1,600
NHCRWA	999904	NORTHWEST HARRIS COUNTY MUD	SAN JACINTO	HARRIS	08428600010110	141	467	646	770	908	1,046
NHCRWA	999904	NHCRWA	SAN JACINTO	HARRIS	08800000010110	0	53,520	80,393	87,241	90,563	94,527
WWP Total						**761**	**56,453**	**84,636**	**92,814**	**97,227**	**102,615**
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	08414900010110	25	14	4	3	3	3
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	08415000010110	363	266	250	213	211	211
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	08415100010110	103	145	184	236	281	334
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	08418600010110	587	920	1,231	1,652	2,029	2,454
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	08419600010110	272	313	349	389	443	513
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	08419700010110	190	268	338	438	540	660
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	08420000010110	199	200	201	201	206	216
NORTH CHANNEL WATER AUTHORITY	607473	PINE TRAILS UTILITY	SAN JACINTO	HARRIS	08430200010110	215	266	312	379	444	521
WWP Total						**1,954**	**2,392**	**2,869**	**3,511**	**4,157**	**4,912**
NRG	398300	STEAM ELECTRIC POWER	BRAZOS	FORT BEND	08100207907912	0	0	0	0	0	8,500
WWP Total						**0**	**0**	**0**	**0**	**0**	**8,500**
RICHMOND-ROSENBERG	999905	RICHMOND	BRAZOS	FORT BEND	08050000007912	0	0	0	0	0	248
RICHMOND-ROSENBERG	999905	ROSENBERG	BRAZOS	FORT BEND	08051800007912	0	0	0	1,091	3,060	5,397
WWP Total						**0**	**0**	**0**	**1,091**	**3,060**	**5,645**
SAN JACINTO RIVER AUTHORITY	240	CONROE	SAN JACINTO	MONTGOMERY	08013000017010	0	5,256	8,550	8,377	14,027	20,630
SAN JACINTO RIVER AUTHORITY	240	WILLIS	SAN JACINTO	MONTGOMERY	08065500017010	0	236	380	377	635	941
SAN JACINTO RIVER AUTHORITY	240	OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	08072600017010	0	272	418	392	637	911
SAN JACINTO RIVER AUTHORITY	240	PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	08073200017010	0	251	334	277	384	475
SAN JACINTO RIVER AUTHORITY	240	PATTON VILLAGE	SAN JACINTO	MONTGOMERY	08073400017010	0	32	47	64	84	113
SAN JACINTO RIVER AUTHORITY	240	SHENANDOAH	SAN JACINTO	MONTGOMERY	08074500017010	0	737	1,098	1,002	1,570	2,200
SAN JACINTO RIVER AUTHORITY	240	COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	0	0	5,299	19,014	16,041	17,533
SAN JACINTO RIVER AUTHORITY	240	COUNTY-OTHER	SAN JACINTO	MONTGOMERY	08075717017010	0	10,308	16,497	23,807	34,448	48,756
SAN JACINTO RIVER AUTHORITY	240	ROMAN FOREST	SAN JACINTO	MONTGOMERY	08080100017010	0	306	561	860	1,283	1,809
SAN JACINTO RIVER AUTHORITY	240	WOODBRANCH	SAN JACINTO	MONTGOMERY	08080700017010	0	74	107	138	177	225
SAN JACINTO RIVER AUTHORITY	240	CUT AND SHOOT	SAN JACINTO	MONTGOMERY	08085400017010	0	86	134	130	212	309
SAN JACINTO RIVER AUTHORITY	240	MAGNOLIA	SAN JACINTO	MONTGOMERY	08090700017010	0	221	380	561	812	1,118
SAN JACINTO RIVER AUTHORITY	240	SPLENDORA	SAN JACINTO	MONTGOMERY	08096200017010	0	83	141	212	313	435
SAN JACINTO RIVER AUTHORITY	240	MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	08100110110109	23,008	27,754	31,791	35,763	38,736	37,244
SAN JACINTO RIVER AUTHORITY	240	MANUFACTURING	SAN JACINTO	MONTGOMERY	08100117017010	0	988	1,384	1,756	2,129	2,504
SAN JACINTO RIVER AUTHORITY	240	STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	08100217017010	0	0	0	0	1,593	4,307

Region H
Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
SAN JACINTO RIVER AUTHORITY	240	MINING	SAN JACINTO	MONTGOMERY	08100317017010	0	216	279	331	382	425
SAN JACINTO RIVER AUTHORITY	240	CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	08407200017010	0	89	143	204	291	395
SAN JACINTO RIVER AUTHORITY	240	CRYSTAL SPRNGS WATER COMPAN	SAN JACINTO	MONTGOMERY	08408100017010	0	257	439	663	982	1,371
SAN JACINTO RIVER AUTHORITY	240	EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	08409800017010	0	203	344	354	613	923
SAN JACINTO RIVER AUTHORITY	240	H M W SUD	SAN JACINTO	MONTGOMERY	08414700017010	0	672	1,055	1,011	1,670	2,425
SAN JACINTO RIVER AUTHORITY	240	HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	08418500010110	0	0	0	0	28	72
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	08426100017010	0	865	1,655	1,788	3,251	5,046
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	08426200017010	0	167	211	165	220	260
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	08426300017010	0	399	624	720	861	964
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	08426400017010	0	395	650	790	951	1,075
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	08426500017010	0	203	259	298	337	369
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	08426600017010	0	184	264	233	358	493
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	08426700017010	0	353	452	351	467	554
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	08426800017010	0	189	272	358	470	600
SAN JACINTO RIVER AUTHORITY	240	NEW CANEY MUD	SAN JACINTO	MONTGOMERY	08427200017010	0	546	944	1,396	2,058	2,854
SAN JACINTO RIVER AUTHORITY	240	POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	08430500017010	0	331	613	966	1,472	2,091
SAN JACINTO RIVER AUTHORITY	240	PORTER WSC	SAN JACINTO	MONTGOMERY	08430700017010	0	777	1,260	1,826	2,047	2,239
SAN JACINTO RIVER AUTHORITY	240	RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	08431200017010	0	826	1,050	831	1,110	1,316
SAN JACINTO RIVER AUTHORITY	240	RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	08432200017010	0	0	0	76	272	398
SAN JACINTO RIVER AUTHORITY	240	SOUTHERN MONTGOMERY COUNTY	SAN JACINTO	MONTGOMERY	08433900017010	0	866	1,118	911	1,231	1,493
SAN JACINTO RIVER AUTHORITY	240	SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	08434300017010	0	102	166	237	336	457
SAN JACINTO RIVER AUTHORITY	240	SPRING CREEK UD	SAN JACINTO	MONTGOMERY	08434400017010	0	224	372	377	653	982
SAN JACINTO RIVER AUTHORITY	240	STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	08434700017010	0	329	423	329	439	521
SAN JACINTO RIVER AUTHORITY	240	THE WOODLANDS	SAN JACINTO	MONTGOMERY	08800100017010	0	13,616	14,985	10,275	13,658	16,196
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY17C	0	374	710	1,087	1,199	1,701
SAN JACINTO RIVER AUTHORITY	240	STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH170:	0	39	68	107	165	249
WWP Total						**23,008**	**68,826**	**95,477**	**118,414**	**148,602**	**184,979**
SUGAR LAND	999906	SUGAR LAND	SAN JACINTO	FORT BEND	08058500007910	0	0	35	35	35	35
SUGAR LAND	999906	SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	08058500007911	0	0	440	404	404	1,304
SUGAR LAND	999906	SUGAR LAND	BRAZOS	FORT BEND	08058500007912	0	155	3,496	3,267	3,508	3,719
SUGAR LAND	999906	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	29	60	536	814	814
SUGAR LAND	999906	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	102	919	1,293	1,291	1,183
SUGAR LAND	999906	FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	08411700007912	0	235	523	521	521	521
SUGAR LAND	999906	FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	08411800007912	0	141	312	312	312	312
SUGAR LAND	999906	FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	08411900007912	0	250	524	519	468	446
SUGAR LAND	999906	FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	08412600007912	0	266	556	549	495	472
SUGAR LAND	999906	FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	08412700007912	0	194	398	404	364	347
SUGAR LAND	999906	FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	08412800007912	0	157	311	323	292	278
SUGAR LAND	999906	PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	08430300007911	0	133	294	288	286	286
WWP Total						**0**	**1,662**	**7,868**	**8,451**	**8,790**	**9,717**
THE DOW CHEMICAL CO.	237200	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	2,752	2,752	2,752	2,752	2,752
THE DOW CHEMICAL CO.	237200	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	0	19,048	19,048	19,048	19,048	19,048
WWP Total						**0**	**21,800**	**21,800**	**21,800**	**21,800**	**21,800**
TRINITY RIVER AUTHORITY	187	IRRIGATION	NECHES-TRINITY	LIBERTY	08100414614607	0	0	0	0	0	0
TRINITY RIVER AUTHORITY	187	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	0	0	0	0	0	1,091
TRINITY RIVER AUTHORITY	187	MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	08100103603609	8,264	9,230	10,252	11,284	12,240	13,445
TRINITY RIVER AUTHORITY	187	MINING	TRINITY	CHAMBERS	08100303603608	4,344	6,494	7,816	9,116	10,411	11,550
TRINITY RIVER AUTHORITY	187	MINING	TRINITY-SAN JACINTO	CHAMBERS	08100303603609	1,215	1,359	1,904	2,488	3,081	3,677
WWP Total						**13,823**	**17,083**	**19,972**	**22,888**	**25,732**	**29,763**
WHCRWA	999907	KATY	SAN JACINTO	FORT BEND	08031200007910	68	238	356	462	601	764
WHCRWA	999907	KATY	SAN JACINTO	HARRIS	08031200010110	756	2,462	3,347	3,989	4,619	5,276
WHCRWA	999907	KATY	SAN JACINTO	WALLER	08031200023710	65	258	409	566	751	968
WHCRWA	999907	HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	08415700010110	421	1,393	1,909	2,292	2,667	3,058
WHCRWA	999907	HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	08415900010110	306	811	932	925	925	925
WHCRWA	999907	HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	08416000010110	189	650	909	1,112	1,324	1,536
WHCRWA	999907	HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	08417000010110	148	475	640	758	874	998
WHCRWA	999907	HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	08418300010110	201	526	598	593	593	593
WHCRWA	999907	TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	08435500010110	334	876	1,005	986	986	986
WHCRWA	999907	WHCRWA	SAN JACINTO	FORT BEND	08800200007910	0	0	1,445	2,010	2,490	2,983
WHCRWA	999907	WHCRWA	SAN JACINTO	HARRIS	08800200010110	0	24,167	35,508	40,356	41,271	42,001
WWP Total						**2,488**	**31,856**	**47,058**	**54,049**	**57,101**	**60,088**

Notes:
Table includes summation of all WMS supplies provided by a WWP to a WUG. In cases where a WUG is also a WWP, supply volumes for the WWP and WUG are still listed in the contracts table for consistency

Appendix 4B

Water Management Strategy Technical Memoranda

This Page Intentionally
Left Blank

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Industrial Conservation

DATE: October 21, 2009

SUMMARY

STRATEGY DESCRIPTION: Address Industrial shortages (manufacturing, mining, and steam-electric power) in Brazoria, Chambers, Fort Bend, Harris, Montgomery, and Walker Counties through industrial conservation measures. Conservation measures will reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: Unknown

SUPPLY SOURCE: Savings from groundwater, Brazos River, San Bernard River, San Jacinto-Brazos Run-of-River, San Jacinto River, Trinity River, Lake Conroe, Lake Houston, and Lake Livingston water demand reductions

IMPLEMENTATION DECADE: Brazoria County - 2010
Chambers County - 2010
Fort Bend County - 2020
Harris County - 2010
Montgomery County - 2010

TOTAL STRATEGY COST: Unknown

UNIT WATER COST: Unknown

Water Management Strategy Analysis Description

INTRODUCTION

There are 6 counties in Region H with projected manufacturing shortfalls within the next sixty years: Brazoria, Chambers, Fort Bend, Harris, Montgomery, and Walker Counties. As part of the regional water planning process, all identified water user group (WUG) shortages must have strategies developed to meet the water supply shortages. Furthermore, conservation is required by the Texas Water Development Board (TWDB) to be considered for all WUGs identified with shortages and should conservation not be chosen as a management strategy, there should be discussion of the reasoning in the text of Report Chapter 4.

The Texas Water Development Board (TWDB) created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The Water Conservation Implementation Task Force consists of a group of volunteers with experience in and commitment to using water more efficiently. The task force developed TWDB Report 362 – Water Conservation Best Management Practices Guide, which outlines specific water conservation best management practices (BMPs) for various water uses. Various BMPs from this report are discussed and outlined in this strategy. Industrial water conservation BMPs, discussed in the TWDB Water Conservation BMP Guide, include the following:

- Industrial Water Audit
- Industrial Water Waste Reduction
- Industrial Submetering
- Cooling Towers
- Cooling Systems (other than cooling towers)
- Industrial Alternative Sources and Reuse of Process Water
- Rinsing/Cleaning BMP
- Water Treatment
- Boiler and Steam Systems
- Refrigeration (including chilled water)
- Once Through Cooling
- Management and Employee Programs
- Industrial Landscape
- Industrial Site Specific Conservation

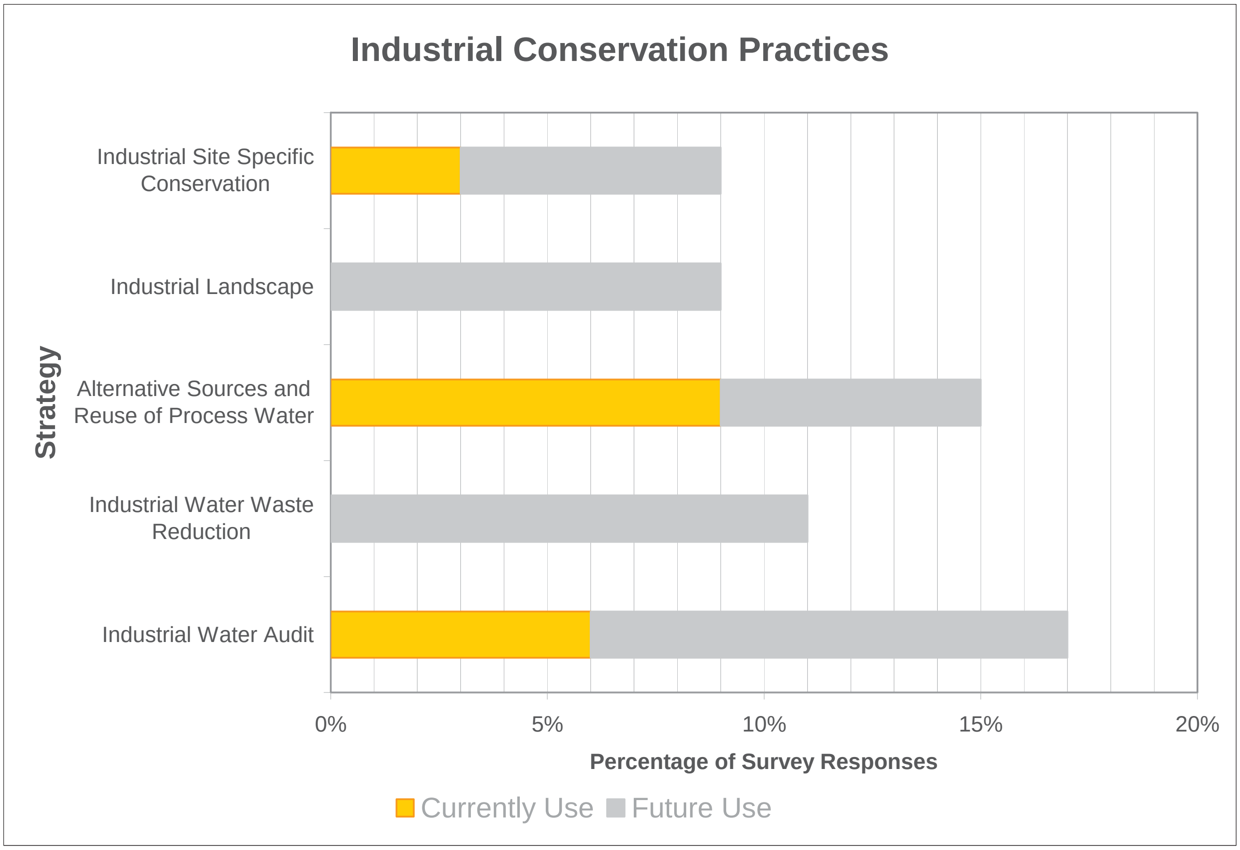
ANALYSIS

The application of the above BMPs to industrial water demands requires site-specific knowledge (i.e., processes used, equipment types, etc.) for the various industrial users in Region H. Currently, all industrial water users are grouped together to form a total "manufacturing" water user group for each county. Therefore, the use of the above BMPs to accurately estimate projected savings and costs for industrial conservation is not currently feasible. Region H is however considering an industrial reuse strategy to meet industrial water shortages in Harris and Galveston Counties. This strategy has been in development for several years for Harris County and is being sponsored by the City of Houston and the individual industrial users represented for this strategy. An industrial resue strategy is also being considered to meet industrial demands in Galveston County and is being sponsored by the Gulf Coast Water Authority (GCWA). Much technical information (i.e., specific water needs for specific processes, water quality requirements, demand patterns, etc.) has been assessed and developed for this strategy. However, this reuse strategy is location and industry specific and therefore not feasible to consider for all industrial demand shortages for the region.

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H to assess current levels of conservation for the 2011 Region H Water Plan. The survey responses indicated that currently, few industrial conservation practices have been implemented but have been considered for future implementation.

Not enough information is currently available on specific industrial processes within the Region to provide meaningful estimates of industrial conservation savings and to develop a conservation strategy that can be applied to manufacturing, mining, and steam-electric power demands across Region H. As industrial conservation strategies are developed in the region and the technical information becomes available, Region H can amend the Regional Water Plan to incorporate these future strategies. The exception to this lack of information is a single manufacturing facility in the Fort Bend County, which intends to meet groundwater reduction plan requirements largely through conservation strategies.

Figure 1 – Potential Industrial Conservation Strategies



WATER USER GROUP APPLICATION

In Brazoria, Chambers, Harris, and Montgomery Counties starting in the year 2010 and Fort Bend County starting in the year 2020.

ISSUES AND CONSIDERATIONS

In summary, the regional water planning group consultants recommend that the planning group not consider industrial conservation as a management strategy unless specific conservation projects (i.e., City of Houston Industrial Reuse Project) are known to exist at the time of plan preparation. The following additional reasons are provided for not considering conservation on a planning level for industrial water users:

- Various types of manufacturing currently exist within Region H and the location and types of specific operations are currently not known.
- The actual water usage required for specific manufacturing processes is not known.
- Very little guidance on implementation costs for specific conservation measures is available.
- Conservation is currently being practiced by manufacturers, in the form of reuse water in plant processes, due to the high cost of treatment for discharge.
- Industrial conservation may take place as the market dictates. Private entities will initiate conservation measures to save on water usage and/or disposal costs as new technologies/processes are developed and if these measures increase overall profits.

- Private manufacturing does not normally seek state funds/grants and therefore will not have the same impetus to develop conservation as municipal sector.

As industrial conservation strategies are developed in the region and the technical information becomes available, Region H can amend the Regional Water Plan to incorporate these future strategies. Although there are no quantifiable negative environmental impacts, it is difficult to estimate the potential beneficial environmental impacts.

REFERENCES

Texas Water Development Board Report 362 – Water Conservation Best Management Practices Guide, November 2004.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: IRRIGATION CONSERVATION

DATE: October 21, 2009

SUMMARY

STRATEGY DESCRIPTION: Address Irrigation shortages in Brazoria, Chambers, Galveston, Liberty, and Waller Counties through irrigation conservation measures. Although Fort Bend County does not have predicted irrigation shortages, it was assumed that irrigation conservation could potentially occur in order to meet other predicted water use shortages. Conservation measures will reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: Demand reductions of	18,792 AFY in Brazoria County
	24,018 AFY in Chambers County
	5,197 AFY in Fort Bend County
	2,392 AFY in Galveston County
	20,876 AFY in Liberty County
	6,606 AFY in Waller County

SUPPLY SOURCE: Savings from groundwater, Brazos River, San Jacinto-Brazos Run-of-River, Neches-Trinity Run-of-River, Trinity River, Sam Rayburn Reservoir, and Lake Livingston water demand reductions

IMPLEMENTATION DECADE:	Brazoria County – 2010
	Chambers County – 2010
	Fort Bend County – 2010
	Galveston County – 2010
	Liberty County – 2010
	Waller County – 2050

TOTAL STRATEGY COST:	$1,850,200 annual cost, on-farm methods in Brazoria County
(Costs rounded to nearest $100)	$198,200 capital cost, canal lining in Brazoria County
	$2,336,300 annual cost, on-farm methods in Chambers County
	$279,200 capital cost, canal lining in Chambers County
	$509,900 annual cost, on-farm methods in Fort Bend County
	$56,500 capital cost, canal lining in Fort Bend County
	$231,100 annual cost, on-farm methods in Galveston County
	$29,400 capital cost, canal lining in Galveston County

$2,089,800 annual cost, on-farm methods in Liberty County

$188,700 capital cost, canal lining in Liberty County

$726,700 annual cost, on-farm methods in Waller County

UNIT WATER COST: $99 per acre-foot of savings in Brazoria County

$98 per acre-foot of savings in Chambers County

$99 per acre-foot of savings in Fort Bend County

$98 per acre-foot of savings in Galveston County

$100 per acre-foot of savings in Liberty County

$110 per acre-foot of savings in Waller County

Water Management Strategy Analysis Description

INTRODUCTION

There are 6 counties in Region H with projected non-municipal irrigation WUG shortfalls within the next sixty years: Brazoria, Chambers, Galveston, Liberty, San Jacinto, and Waller Counties. All of these counties except San Jacinto County predominantly grow rice, which requires considerably more water than many other crops and is addressed in more detail within this strategy. San Jacinto County agricultural activities are mainly in the production of timber products, poultry, and livestock. The Trinity River Authority currently has the capability to expand existing contracts to meet the limited irrigation demands within that county. Fort Bend County does not have predicted irrigation shortages through the planning period, but other water user groups within the county will experience shortfalls in water supply. This technical memorandum assumes that irrigation conservation will occur in Fort Bend County for the surface water supply portion of irrigation usage and the estimated savings could potentially be available for use by other water user groups. Therefore, this strategy focuses exclusively on the reduction of rice irrigation demand through conservation.

The Texas Water Development Board (TWDB) created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The Water Conservation Implementation Task Force consists of a volunteer group of persons with experience in and commitment to using water more efficiently. The task force developed TWDB Report 362 – Water Conservation Best Management Practices Guide, which outlines specific water conservation best management practices (BMPs) for various water uses. Various BMPs from this report are discussed and outlined in this strategy.

To supplement the TWDB Report 362, report "Potential Rice Irrigation Water Conservation Measures, Water Planning Group - Region H," James W. Stansel of Texas A&M University (TAMU) proposes several conservation methods to reduce irrigation water demand. The study first addresses on-farm conservation practices. Specifically covered are the benefits of land leveling to reduce the water required for each flush, multiple field inlets to reduce overfilling of the higher cuts, reduced levee spacing to reduce the water required for each flush and replacing irrigation ditches with pipes to reduce seepage and evaporation losses. The study also addresses off-farm conservation, through the lining of irrigation canals to reduce losses.

The conservation methods proposed in the Texas A&M report were evaluated for use in Brazoria, Chambers, Fort Bend, Galveston, Liberty, and Waller Counties.

ANALYSIS

Both on-farm and off-farm conservation measures for agricultural irrigation are outlined in the TWDB Report 362 and listed below. On-farm conservation measures include, but are not limited to:

- Irrigation Scheduling
- Volumetric Measurement of Irrigation Water use
- Crop Residue Management and Conservation Tillage
- On-Farm Irrigation Audit
- Furrow Dikes
- Land Leveling
- Contour Farming
- Conversion of Supplement Irrigated Farmland to Dry-land Farmland
- Brush Control/Management
- Lining of On-farm Irrigation Ditches
- Replacement of On-farm Irrigation Ditches with Pipelines
- Low Pressure Center Pivot Sprinkler Irrigation Systems
- Drip/Micro-Irrigation System
- Gated and Flexible Pipe for Field Water Distribution Systems
- Surge Flow Irrigation for Field Water Distribution Systems
- Linear Move Sprinkler Irrigation Systems

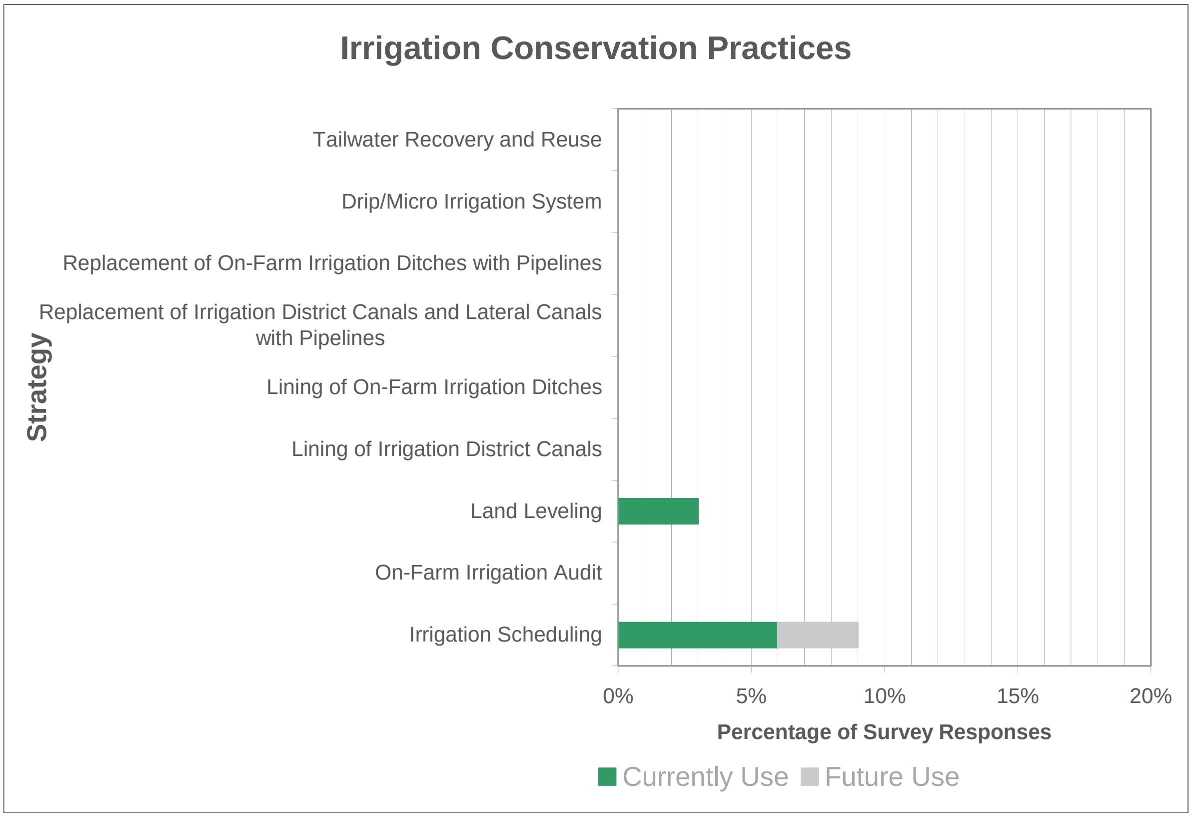
On-farm conservation was evaluated for all acreage planted in rice. The acreage is based on amounts documented in "Texas Rice Acreage" published by the U. S. Department of Agriculture Statistics Service. On-farm conservation was focused on rice production and therefore conservation measures used to develop savings estimates are specific to the rice industry. Due to local experience and realized savings estimates, the TAMU report was utilized to develop costs and savings for on-farm conservation. The conservation practice modeled was multiple irrigation inlets combined with land leveling. The potential annual irrigation savings associated with multiple irrigation inlets and land leveling are 0.750 acre-feet per acre and 0.583 acre-feet per acre, respectively. This method produces an on-farm conservation savings rate of 1.4 acre-feet per irrigated acre. The TAMU report assumes that on-farm conservation can be applied to 70% of the irrigated acreage. Use of these conservation measures is estimated to cost approximately $110 per acre-foot. The potential water savings are shown in Table 1.

The TWDB Report 362 also outlines various off-farm conservation BMPs as listed below:

- Lining of District Canals
- Replacement of Irrigation District Canals and Lateral Canals with Pipelines

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H to assess current levels of conservation for the 2011 Region H Water Plan. Of the 35 survey responses returned only one detailed the use of conservation practices for agriculture. The results of the survey are shown in Figure 1. The figure shows that approximately 6% of the WUGs that returned the surveys currently utilize irrigation scheduling as a method of conservation. This result is inflated due to the use of irrigation scheduling for non agricultural uses such as golf course and landscape irrigation.

Figure 1 – Potential Irrigation Conservation Strategies



Off-farm conservation is applied to all acreage irrigated with surface water. This acreage was determined using TWDB Water Use Survey information. This method was not applied to Waller County, where only groundwater is used. The TWDB report was supplemented with costs and savings identified in the TAMU report specific for Region H. The TAMU report estimates canal lining conservation savings as 38 acre-feet per canal mile. A ratio of 16.5 feet of irrigation canal per acre of irrigated land is used to calculate canal lengths. Partial canal lining using a 45 mil EPDM (synthetic rubber membrane) is selected from the TAMU report based upon the projected cost of $2916 per canal-mile, or $7 per acre-foot of savings. The potential water savings for Brazoria, Chambers, Fort Bend, Galveston, and Liberty Counties are shown in Table 2.

The average cost of water saved through on-farm conservation is $110 per acre-foot. The average cost of water saved through canal lining is $8.25 per acre-foot. Because the ratio of on-farm to off-farm conservation varies by county, the average cost of water is also unique to each county. Brazoria County averages $99 per acre-foot, Chambers County averages $98 per acre-foot, Fort Bend County averages $99 per acre-foot, Galveston County averages $98 per acre-foot, Liberty County averages $100 per acre-foot and Waller County averages $110 per acre-foot.

WATER USER GROUP APPLICATION

In Brazoria, Chambers, Fort Bend, Galveston, and Liberty Counties, both methods of conservation are recommended for implementation, starting in the year 2000. Additional irrigation WUG shortages will continue even in those counties with existing irrigation shortages after application of both on-farm and off-farm conservation practices, although conservation will delay further irrigation shortages in Liberty County until year 2030.

Irrigation conservation will be applied to the portion of Fort Bend County which receives surface water for irrigation. Due to Fort Bend Subsidence District Regulations, groundwater that potentially could be conserved due to the BMPs identified within this memorandum is not available for other water user groups within the county to utilize; therefore no incentive exists for funding the conservation efforts.

Groundwater conservation savings were not included in this technical memorandum for Fort Bend County.

In Waller County, rice irrigation conservation is recommended for implementation beginning in the 2050-decade. Eastern Waller County, which draws water from the Gulf Coast Aquifer, has the potential to reduce irrigation demand with on-farm conservation and offset the projected shortages through year 2060.

The projected irrigation demand, supply and conservation savings for these counties are shown in Table 3.

ISSUES AND CONSIDERATIONS

In those counties served by wholesale water providers with surplus supplies, irrigation contracts potentially could be expanded to aid in meeting the projected shortages. The current costs of contract irrigation water from various wholesale water providers are approximately $77 per acre-foot from Chocolate Bayou Water Company, $39.75 per acre-foot from Brazos River Authority, $87 per acre-foot from Gulf Coast Water Authority, and $85 per acre-foot from Chambers-Liberty Counties Navigation District. The cost per acre-foot of water saved due to irrigation conservation is similar to the cost of contracting additional irrigation water from the above wholesale water providers and therefore it currently appears that minimal motivation exists for implementing extensive irrigation conservation measures. However, as contract water supplies become more scarce and expensive to acquire, irrigation conservation may become more cost effective.

Interruptible supplies, where available, could potentially be a cost-effective strategy to meet irrigation demands in counties where shortages occur. In Waller County, the groundwater supply conserved by irrigation conservation could potentially be used to meet other WUG shortages within the County including municipal WUGs. However, the use of conservation as opposed to interruptible supplies has positive environmental impacts. Although there are no quantifiable negative environmental impacts, it is difficult to estimate the potential beneficial environmental impacts. Although specific on-farm and off-farm conservation BMPs were outlined in this strategy, irrigators that identify other BMPs specific (such as those listed in TWDB Report 362) to their irrigation conservation needs should utilize those measures.

REFERENCES

Texas Water Development Board Report 362 – Water Conservation Best Management Practices Guide, November 2004.

Potential Rice Irrigation Water Conservation Measures, Water Planning Group - Region H, James W. Stansel, Texas A&M University System, July 2000

Texas Water Development Board Report 347 - Surveys of Irrigation in Texas 1958, 1964, 1969, 1974, 1979, 1984, 1989, 1994, and 2000, August 2001.

Table 1: Rice Irrigation Conservation

Brazoria	Irrigated Acres	18,910	acres
	Rice Acres	17,163	acres
	70% to be improved	12,014	acres
	Savings @ 1.4 ac-ft / acre	16,820	ac-ft
	Annual Cost @ $110 / ac-ft	$1,850,200	$/yr
Chambers	Irrigated Acres	23,400	acres
	Rice Acres	21,672	acres
	70% to be improved	15,170	acres
	Savings @ 1.4 ac-ft / acre	21,239	ac-ft
	Annual Cost @ $110/ ac-ft	$2,336,290	$/yr
Fort Bend	SW Irrigated Acres	4,731	acres
	SW Rice Acres	4,731	acres
	70% to be improved	3,312	acres
	Savings @ 1.4 ac-ft / acre	4,636	ac-ft
	Annual Cost @ $110 / ac-ft	$509,960	$/yr
Galveston	Irrigated Acres	2,530	acres
	Rice Acres	2,144	acres
	70% to be improved	1,501	acres
	Savings @ 1.4 ac-ft / acre	2,101	ac-ft
	Annual Cost @ $110 / ac-ft	$231,110	$/yr
Liberty	Irrigated Acres	19,775	acres
	Rice Acres	19,386	acres
	70% to be improved	13,570	acres
	Savings @ 1.4 ac-ft / acre	18,998	ac-ft
	Annual Cost @ $110 / ac-ft	$2,089,780	$/yr
Waller	Irrigated Acres	7,031	acres San Jacinto Basin only
	Rice Acres	6,741	acres
	70% to be improved	4,719	acres
	Savings @ 1.4 ac-ft / acre	6,606	ac-ft
	Annual Cost @ $110 / ac-ft	$726,660	$/yr

San Jacinto - Not a Rice Producing County

Note 1: Waller County has a surplus of potential irrigation water in the Brazos Basin. However, the surplus is in the Brazos River Aluvium and not the Gulf Coast Aquifer, and therefore not considered available in the San Jacinto Basin.

Table 2: Conservation from Lining Irrigation Canals

	Brazoria	Chambers	Fort Bend	Galveston	Liberty
SW Acres (Includes rice & row crops) (acres)	16,603	23,400	4,731	2,454	15,820
Canal length @ 16.5 feet/acre (miles)	51.9	73.1	14.8	7.7	49.4
Conservation Savings Rate (ac-ft/mile)	38	38	38	38	38
Partial lining saves (ac-ft)	1,972	2,779	562	291	1,879
Capital Cost @ $2916 / mile	$198,206	$279,169	$56,521	$29,406	$188,659
Annual Cost (20-year 6%) ($/yr)	($16,302.37)	($22,961.53)	($4,648.85)	($2,418.66)	($15,517.09)
Average Annual Water Cost per ac-ft ($/ac-ft)	$8.27	$8.26	$8.27	$8.31	$8.26

Table 3: Projected Implementation Dates and Balances

Brazoria	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	135,033	123,115	118,544	115,788	115,788	115,788
Supply	51,553	48,015	44,332	41,669	39,869	38,225
Rice Consv.	16,820	16,820	16,820	16,820	16,820	16,820
Canal Consv.	1,972	1,972	1,972	1,972	1,972	1,972
Balance w/o Cons.	-83,480	-75,100	-74,212	-74,119	-75,919	-77,563
Balance w/ Cons.	-64,688	-56,308	-55,420	-55,327	-57,127	-58,771

Chambers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	117,777	117,777	117,777	117,777	117,777	117,777
Supply	128,861	128,344	127,987	127,630	127,250	126,847
Rice Consv.	21,239	21,239	21,239	21,239	21,239	21,239
Canal Consv.	2,779	2,779	2,779	2,779	2,779	2,779
Balance w/o Cons.	-27,053	-27,277	-27,411	-27,534	-27,652	-27,753
Balance w/ Cons.	-20,376	-20,600	-20,734	-20,857	-20,975	-21,076

Fort Bend	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	53,455	53,455	53,455	53,455	53,455	53,455
Supply	53,455	53,455	53,455	53,455	53,455	53,455
Rice Consv.	4,636	4,636	4,636	4,636	4,636	4,636
Canal Consv.	562	562	562	562	562	562
Balance w/o Cons.	0	0	0	0	0	0
Balance w/ Cons.	5,198	5,198	5,198	5,198	5198	5,198

Galveston	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	10,342	10,342	10,342	10,342	10,342	10,342
Supply	1,162	1,162	1,162	1,162	1,162	1,162
Rice Consv.	2,101	2,101	2,101	2,101	2,101	2,101
Canal Consv.	291	291	291	291	291	291
Balance w/o Cons.	-9,180	-9,180	-9,180	-9,180	-9,180	-9,180
Balance w/ Cons.	-6,788	-6,788	-6,788	-6,788	-6,788	-6,788

Liberty	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	82,901	82,901	82,901	82,901	82,901	82,901
Supply	83,834	81,770	80,253	78,596	76,636	74,432
Rice Consv.	18,998	18,998	18,998	18,998	18,998	18,998
Canal Consv.	1,879	1,879	1,879	1,879	1,879	1,879
Balance w/o Cons.	-11,846	-12,444	-13,930	-15,555	-17,478	-19,640
Balance w/ Cons.	-6,657	-6,697	-6,732	-6,767	-6,805	-6,833

Table 3 - Continued

Waller	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	22,978	22,978	22,978	22,978	22,978	22,978
Supply	22,978	22,504	22,978	22,965	22,662	22,114
Rice Consv.	6,606	6,606	6,606	6,606	6,606	6,606
Canal Consv.	0	0	0	0	0	0
Balance w/o Cons.	0	0	0	0	-316	-864
Balance w/ Cons.	6,606	6,606	6,606	6,606	6,290	5,742

Note 1: Waller County supply surpluses in the Brazos Basin are not included in the supply total. These surpluses exist in the Brazos River Aluvium and are not available to irrigators in the San Jacinto Basin.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: MUNICIPAL CONSERVATION

DATE: October 21, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Implementation of "Water Conservation" management practices for Municipal WUG's.

SUPPLY QUANTITY: Potential Municipal demand reductions of:

45,605 ac-ft in 2010
65,318 ac-ft in 2020
75,696 ac-ft in 2030
84,503 ac-ft in 2040
94,392 ac-ft in 2050
105,494 ac-ft in 2060

SUPPLY SOURCE: Savings from existing groundwater and surface water supplies

TOTAL STRATEGY COST:
(Costs rounded to nearest $100)

$9,868,100 in 2010
$14,139,900 in 2020
$16,355,100 in 2030
$18,245,200 in 2040
$20,365,700 in 2050
$22,750,300 in 2060

UNIT WATER COST:
WUGs with Population < 3,301 - $202 per acre foot
WUGs with 3,300 < Population < 10,001 - $311 per acre foot
WUGs with Population > 10,000 - $213 per acre foot

Water Management Strategy Analysis Description

INTRODUCTION

Water conservation is a demand management strategy that pro-actively causes a decrease of future water needs. Conservation facilitates more efficient use of existing water supplies by allowing existing supplies to serve demands for a longer period of time and/or to delay the need to develop new supplies. The current Region H water demands have an embedded quantity of conservation savings. This quantity has been determined based on the assumption that water will be saved as a result of the 1991 State Water-Efficient Plumbing Act.

The use of water conservation strategies/BMPs will accomplish a higher degree of conservation than is already contained within the current demand projections. This technical memorandum illustrates the application of water conservation to Municipal and Municipal County-Other WUG's that have projected water shortages.

The City of Houston volunteered to apply conservation as a management strategy even though they have no water shortage through the planning period. Based on information provided by the City of Houston, conservation for the City was estimated at 6.3 percent of the total projected demand for each planning decade. The City's voluntary municipal water conservation added approximately 37,603 acre-feet of water savings in the year 2060 for the region as compared to the 2060 estimated water savings resulting from water conservation for only those WUGs with projected shortages. This additional conservation savings, as a result of the City's voluntary program, equals approximately 36 percent of the total projected municipal water conservation savings for the region.

Water conservation is achieved through the use of various water conservation measures. There are in excess of 200 different types of conservation measures in use by public utilities within the United States. The Region H water demands are lower than they would otherwise have been because of anticipated water savings as a result of the 1991 State Water-Efficient Plumbing Act.

WUGs with water supply shortages reported in Chapter 3 of this report will be required to have a management strategy identified to meet this shortage. The Texas Water Development Board requires that the Region H Planning Group consider water conservation as a management strategy for WUGs with identified shortages. If the planning group determines that water conservation is not feasible, for any reason, it must be documented. The following sections discuss the application of municipal conservation as a management strategy within Region H.

TWDB WATER CONSERVATION BMPs AND ANALYSIS APPROACH

The Texas Water Development Board (TWDB) created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The Water Conservation Implementation Task Force consists of a volunteer group of persons with experience in and commitment to using water more efficiently. The task force developed TWDB Report 362 – Water Conservation Best Management Practices Guide, which outlines specific water conservation best management practices (BMPs) for various water uses. Various BMPs from this report are discussed and outlined in this strategy.

The list of those municipal water conservation BMPs/strategies outlined in the TWDB Report 362 is as follows:

- System Water Audit and Water Loss
- Water Conservation Pricing
- Prohibition on Wasting Water
- Showerhead, Aerator and Toilet Flapper Retrofit
- Residential Ultra Low Flow Toilet Replacement Programs
- Residential Clothes Washer Incentive Program
- School Education
- Water Survey for Single-Family and Multi-Family Customers
- Landscape Irrigation Conservation and Incentives
- Water Wise Landscape Design and Conversion Programs
- Athletic Field Conservation
- Golf Course Conservation
- Metering of All New Connections and Retrofit of Existing Connections
- Wholesale Agency Assistance Programs
- Conservation Coordinator
- Water Reuse
- Public Information BMP
- Rainwater Harvesting and Condensate Reuse
- New Construction Graywater BMP
- Park Conservation BMP

Conservation Programs for Industrial, Commercial, and Institutional Accounts

In order to apply water conservation as a management strategy within Region H, an approach to develop estimates of savings and costs needed to be developed. The following paragraphs discuss the approach utilized to apply conservation.

For those WUGs with identified water shortages, a letter discussing conservation was mailed to each WUG. The conservation letter essentially ascertained whether or not the WUG currently has a conservation plan and requested information related to the effectiveness of existing conservation measures. The letter also contained a survey to determine which conservation BMPs (those identified by the Conservation Task Force) the WUGs currently use and those they would consider in the future.

To aid in the development of costs and savings associated with this strategy the TWDB Report 362 was supplemented with savings and costs identified in the COH water conservation plan.

Water conservation was applied prior to expanding contracts for those WUGs with existing contracts with wholesale water providers. This strategy was only applied to those WUGs with shortages as identified in Chapter 3. The WUGs were classified into four groups for purposes of applying this strategy. The first three classifications were based on WUG population and consisted of population less than 3,301 persons, population greater than 3,300 persons but less than 10,001 persons, and population greater than 10,000 persons. These three WUG size classifications were developed to recognize and account for the various degree by which WUGs of different sizes will likely implement advanced conservation measures. Larger WUGs with greater resources are more likely to be able to implement a comprehensive conservation program than a smaller WUG with lesser resources. Therefore, the expected water savings and costs for the region are also likely to differ depending on the relative size of the WUG. A fourth classification consisted of WUGs with conservation plans outlining specific conservation practices and water saving goals that were more aggressive than the expected water savings determined by classifying the WUG in one of the other three categories.

WATER CONSERVATION BMP SURVEY

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H. The survey asked each utility to provide information regarding recent per capita water use, current and future conservation strategies, efficacy of current strategies and the cost associated with each strategy.

The results of the survey were compiled to evaluate which conservation BMPs were currently being performed and which BMPs will most likely be evaluated by the WUGs for future use.

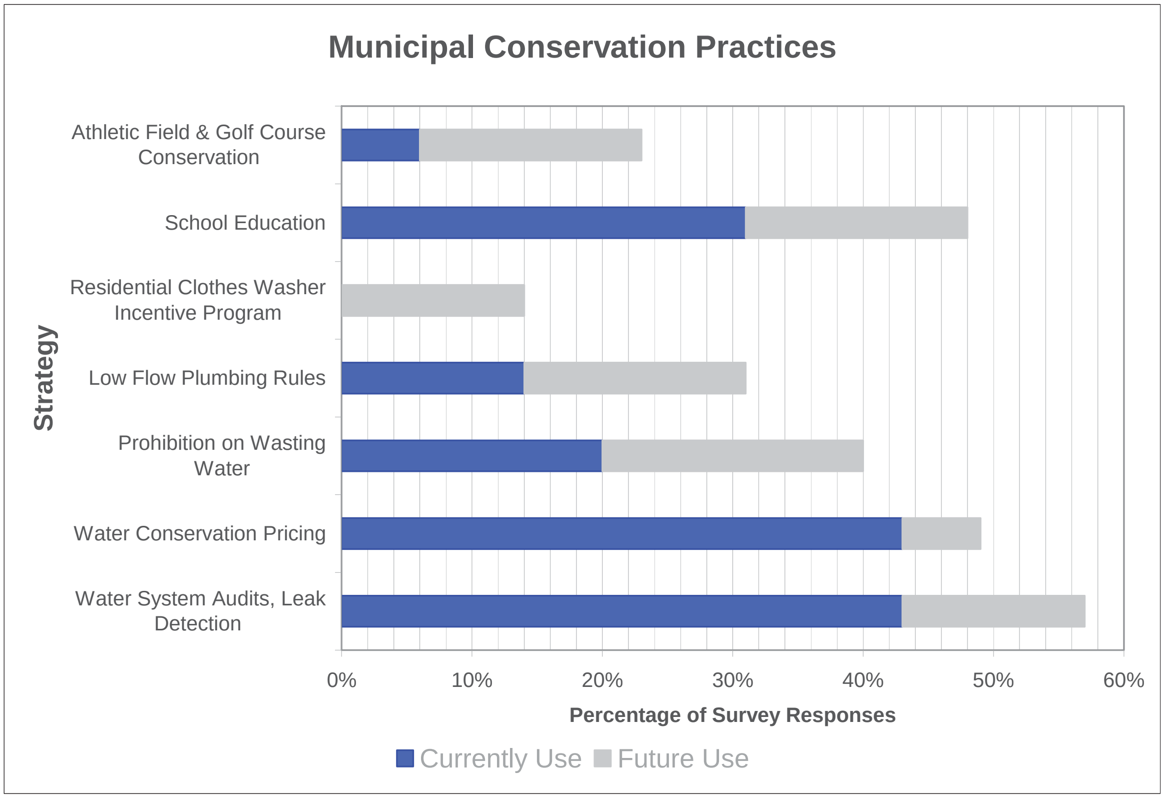
The evaluation of the returned surveys yielded the most-likely conservation BMPs to be considered for conservation management strategy. The WUGs were classified into four groups consisting of:

- Population less than 3,301 persons
- Population greater than 3,300 persons but less than 10,001 persons
- Population greater than 10,000 persons
- WUG specific Conservation Plans

Approximately 35 surveys were returned out of the 254 conservation letters mailed. Thirty-four surveys were returned by utilities detailing conservation practices for municipal, industrial and commercial customers. One survey was returned detailing agricultural conservation methods. The results described in the following paragraphs will focus on the utilities that have implemented water conservation measures for municipal, industrial, and commercial use. The utilities serving populations less than 3,301 persons consisted of approximately 17 percent of the survey responses. Utilities serving populations greater than 3,300 persons but less than 10,001 persons consisted of approximately 43 percent of the survey responses. The remaining 40 percent were from wholesale water providers or utilities serving populations greater than 10,000 persons.

The results of the survey are provided in Figure 1 below. It is recommended that all of the listed municipal conservation BMPs be considered by individual WUGs within Region H in the development of future water conservation plans.

Figure 1 – Potential Water Conservation Strategies



DEVELOPMENT OF COSTS AND SAVINGS FOR THE REGION

In general, Water Conservation practices, which are not linked to the 1991 State Water-Efficient Plumbing Act, are those that are more aggressive in terms of the timing of their usage (pro-actively managed to occur sooner in time) or the application of additional specific conservation practices. An estimate of water savings and expected costs is required to be developed for the region as a means to compare water conservation to other water management strategies. The TWDB Report 362, which provides detail information for municipal conservation BMPs, does not provide sufficient detail relating to projected water savings and costs for all the BMPs provided.

To aid in the development of costs and savings associated with this strategy the TWDB Report 362 was supplemented with savings and costs identified in the COH water conservation plan. For reference purposes, Figure 2 has been included to summarize the conservation practices contained within the current City of Houston water conservation program and the estimated costs and savings. The BMPs identified in the COH conservation plan were then used to assist in estimating savings and costs for the Region. This set of eight practices identified in the COH conservation plan is projected to result in an overall savings of approximately 6.3 percent of total water use by year 2005 and then be sustained at an annual level of approximately 6.3 percent. It can be anticipated that these and other similar practices could be used to accomplish similar conservation savings proposed for the Region H Municipal WUG’s. The total projected water savings reduction by year for all of the Municipal WUG’s with shortages is shown in Table 1.

The per unit cost of each of the COH conservation measures identified for estimating savings and costs for the region is shown below. For specific information used to estimate conservation BMP costs and savings, refer to Figure 2.

Cost Per Municipal Conservation Measure

- Water Audits ($639 per acre-foot)
- Commercial Indoor Audits ($285 per acre-foot)
- Cooling Tower Audits ($189 per acre-foot)
- Indoor/Exterior Audits ($212 per acre-foot)
- Pool/Fountain Standards ($56 per acre-foot)
- Pool/Fountain Audits ($109 per acre-foot)
- COH In-House Programs ($7 per acre-foot)
- Unaccounted-for-water ($94 per acre-foot)
- Public Education ($358 per acre-foot)
- Water Wise Program ($155 per acre-foot)

It is recommended that all the conservation BMPs outlined in TWDB Report 362 be utilized within Region H for those WUGs with shortages to meet conservation goals. However, for purposes of estimating water savings and costs for Region H the above COH BMPs were used as a basis for analysis. The following sections outline the COH BMPs utilized to estimate potential savings and costs.

RESULTS

Estimates of potential savings and costs for WUGs with shortages are presented below by population over the sixty-year planning period.

Population < 3,301

For those WUGs with populations less than 3,301 persons over the sixty-year planning cycle, the following COH conservation BMPs were chosen to estimate savings and costs:

- Unaccounted-for-water
- Public Education
- Water Wise Program

As shown, a large range of potential costs exists. A weighting of these per unit costs applied produces an average cost of $202 per acre-feet per year. This cost is proposed for use for the water conservation management strategy for the WUGs with populations less than 3,301 persons.

3,300 < Population < 10,001

For those WUGs with populations greater than 3,300 persons and less than 10,001 persons, the following COH conservation BMPs were chosen to estimate savings and costs:

- Unaccounted-for-water
- Public Education
- Water Wise Program
- Indoor/Exterior Audits

As shown, a large range of potential costs exists. A weighting of these per unit costs produces an average cost of $311 per acre-feet per year. This WUG classification includes additional public auditing water conservation measures than smaller (less than 3,301 population) WUGs. This cost is proposed for use for the water conservation management strategy for the WUGs with populations greater than 3,300 and less than 10,001 persons.

Population > 10,000

For those WUGs with populations greater than 10,000 persons, the following COH conservation BMPs were chosen to estimate savings and costs:

- Water Audits
- Indoor/Exterior Audits
- Pool/Fountain Standards
- Pool/Fountain Audits
- COH In-House Programs
- Unaccounted-for-water
- Public Education
- Water Wise Program

As shown, a large range of potential costs exists. A weighting of these per unit costs produces an average cost of $213 per acre-feet per year. This WUG classification includes additional public and commercial BMPs when compared to the BMPs outlined for WUGs with population ranging from 3,300 to 10,000 persons. This cost is proposed for use for the water conservation management strategy for the WUGs with populations greater than 10,000 persons.

Water User Group Application

Table 1 provides a listing of all of the Municipal and Municipal County-Other WUG's with shortages within Region H. This table shows the water demands for the 2011 Region H Water Plan , the expected conservation savings from implementing Strategies/BMPs, and the remaining shortage, if any. As shown, conservation savings as a percentage of total demand generally ranges up to approximately 6.3 percent. Based on this analysis, usage of Water Conservation could eliminate all projected shortages for the following WUGs.

WUG NAME	COUNTY	BASIN
COUNTY-OTHER	LEON	TRINITY
COUNTY-OTHER	WALKER	TRINITY
CROSBY MUD	HARRIS	SAN JACINTO
DEER PARK	HARRIS	SAN JACINTO
DEER PARK	HARRIS	SAN JACINTO-BRAZOS
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	TRINITY
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WALKER	TRINITY
PRAIRIE VIEW	WALLER	SAN JACINTO

The remaining WUGs in Region H with projected shortages will require a combination of municipal conservation and some other water management strategy to meet shortages for each planning decade.

ISSUES AND CONSIDERATIONS

Accomplishing the water conservation demand reductions, as described herein, requires pro-active implementation. Identification of an appropriate utility or political subdivision to manage or legislate use of the conservation measures to the municipal WUG's is one of the critical issues facing the success of this strategy.

It should be noted that some of the WUG's are collections of small systems either publicly or privately owned. These systems are the least likely to have any type of coordinated effort to reduce water consumption. Certainly the individual systems themselves will have varying attitudes toward conservation, with some moving forward with conservation plans and others concerned solely with revenue generated to support system operations.

The implementation of conservation measures for collective groupings of small systems is problematic from the fact that there is no single point of accountability. These savings may or may not accrue, depending upon the efforts or lack thereof of many different utilities. For these systems, there is no leverage to encourage conservation, there is no incentive for them to implement and pay for conservation education, and there is no economic incentive for them to reduce billings as it reduces the potential sale value of their systems.

There are no negative environmental impacts associated with the conservation strategies outlined herein or that may results from implementation of the conservation management strategy. Large-scale structural modifications (constructing physical facilities) are not necessary to implement the water conservation management strategy. Therefore, the resultant type of construction impacts is not anticipated. However, conservation may create various types of social impacts. Notably, water conservation has the potential to increase water rates to compensate for a loss of revenue from water sales by each water utility. For instance, the City of Houston Water Conservation Plan discussed this issue and concluded that the rate of reduced water use from their anticipated program would have a minimal impact (1.5 percent) on the price of water to the customer. That report went on to state that reduced water sales would be offset from the positive impact of deferred capital cost expenditures of water and wastewater facilities that would have been required at an earlier date without water conservation.

Figure 1: City of Houston Conservation Alternatives

Residential	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Water Audits[1,8]	Local officials would offer indoor/outdoor water audits to existing single-family & multi-family residential customers w/ high water use.	0.14%	$488.00
Public	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Indoor/Exterior Audits[9,11,12,21]	Local officials would perform water audits at all public buildings focusing on indoor plumbing fixtures & irrigation water uses.	0.41%	$162.00
Pool/Fountain Audits	Local officials would provide audits on-site & produce a customized report that describes fixture & valve inspections, leak tests, retrofit possibilities, pool/fountain cleaning & backwashing operation & improvements, & recycling opportunities for each site. Leak detection by a private contractor would be provided if warranted.	0.08%	$83.00
Pool/Fountain Standards	All new publicly owned pools and fountains would be required to meet water efficiency minimum standards as established.	0.09%	$43.00
In-House Programs	Targets all local government departments not currently charged for water. Directors/managers of these would receive an "in-house" bill, detailing their water usage. A goal of 20% water usage (by a specific time period) would be established.	0.07%	$5.00
Other Programs	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Unaccounted-for-Water[1]	Local officials would increase its leak protection & repair program w/ goal of reducing "lost-and-unaccounted-for" water to 10% (from current average of 17%).	3.90%	$72.00
Public Education[7]	Local officials would offer water conservation education to all schools, civic associations, Girl Scout & Boy Scout troops, etc.	1.51%	$273.00

Waterwise & Energy Efficient Program[4,7,17]	Local officials would maintain a partner w/ the Harris-Galveston Coastal Subsidence District to provide 5th grade students in the area w/ a 2-week conservation education program that provides retrofit devices (low-flow shower head, kitchen aerator, bathroom aerator, etc.).	0.14%	$118.00

As identified above the following notes relate portions of the TWDB Conservation Task Force identified water conservation measures to those utilized in the City of Houston's water conservation plan. They do not correlate directly, but an end user could if feasible utilize all or parts of the TWDB Conservation Task Force identified measures or other known BMPs or strategies.

[1]System Water Audit and Water Loss
[4]Showerhead, Aerator and Toilet Flapper Retrofit
[7]School Education
[8]Water Survey for Single-Family and Multi-Family Customers
[9]Landscape Irrigation Conservation and Incentives
[11]Athletic Field Conservation
[12]Golf Course Irrigation
[17]Public Information BMP
[21]Conservation Practices for Industrial, Commercial, and Institutional Accounts

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: San Jacinto River Authority/Trinity River Authority Contract Agreement

DATE: November 16, 2009

SUMMARY

STRATEGY DESCRIPTION: Transfer 53,000 acre-feet per year of SJRA-owned supplies in the Trinity River and 77,000 acre-feet per year of TRA supply in Lake Livingston to Montgomery County to meet projected shortages after in-basin supplies are fully utilized.

SUPPLY QUANTITY: Approximately 76,500 acre-feet per year (new TRA contract)

SUPPLY SOURCE: Lake Livingston (existing)

STARTING DECADE: 2050

TOTAL STRATEGY COST: $302,781,600 (Costs rounded to nearest $100)

UNIT WATER COST: $687 per ac-ft allocated

Water Management Strategy Analysis Description

Introduction

Montgomery County demands will exceed available groundwater and current surface water contracts beginning in year 2010. These water shortages are projected to grow from 17,000 acre-feet per year in 2010 to 180,000 acre-feet per year in 2060. Currently, the San Jacinto River Authority (SJRA) is the only Wholesale Water Provider for the majority of the county. Under this strategy, in-county and in-basin supplies are fully utilized, and the remaining shortage is met through the purchase and transfer of Trinity River Authority (TRA) supply in Lake Livingston by the SJRA. The strategy requires the combined use of supplies owned by the SJRA and the TRA.

Analysis

This strategy consists of first using unallocated supplies in Lake Conroe to meet Montgomery County needs. This may be accomplished through a water sales contract, either through SJRA as a wholesale water provider, or directly to a WUG such as Conroe, should it elect to construct an independent water treatment plant. This portion of the strategy carries no major infrastructure cost, because the supplies are located at the point of use. Treatment and transmission facilities costs would be reflected at the WUG level.

The second phase of this strategy requires the full utilization of SJRA supplies within the San Jacinto Basin. To provide treated water to the southern and eastern portions of Montgomery County, a treated water facility will need to be constructed in the vicinity of the existing SJRA pump station

The third phase of this strategy requires the transfer of SJRA supplies in the Trinity Basin to Montgomery County. One of the SJRA water rights (08-4279) is not yet permitted for use in the San Jacinto Basin. Unless an agreement could be reached to convey SJRA supplies through Luce

Bayou, a new conveyance would need to be constructed from the Trinity Basin to Montgomery County. There is the potential for alternate routes pass through the Sam Houston National Forest, which increases the risk of adverse environmental impacts due to construction and maintenance activities. The WWP-level cost of this conveyance is shown in Table 1.

Finally, to meet the shortages projected for the 2050 and 2060 decades, additional supplies must be obtained. The TRA is projected to have surplus supply remaining in Lake Livingston after other strategies are applied. This strategy proposes the SJRA entering into a contract for 59,000 acre-feet per year to meet the remaining Montgomery County demands, and conveying that supply via the new conveyance

Water User Group Application

The water conveyed into the San Jacinto River basin through this strategy would meet all projected shortages in Montgomery County throughout the planning period. Water available in Lake Conroe will be used to serve the northern portion of the county. New treatment and transmission facilities will be required at each reservoir. These costs will be reflected in the WWP infrastructure cost estimates once developed

Environmental Impact

Additional transfer of Trinity River water supplies into the San Jacinto River basin will decrease freshwater inflows into the upper Trinity Bay estuary. Riverine flows should remain unchanged between Lake Livingston and the Coastal Water Authority diversion point. Downstream of the CWA diversion point, instream flows will decrease by approximately 1.7% (based upon both diversions totaling 155 cfs, compared to a 20-year average flow of 9100 cfs). This reduction potentially affects White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitats. Increased use of stored water from Lake Livingston may result in more frequent level fluctuations and prolonged low lake levels, which may adversely impact wetland areas along the lake perimeter. These fluctuations may also adversely affect property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

Return flows from this supply (typically 60% of the total diverted) will return to Galveston Bay via the San Jacinto River and Houston Ship Channel, affecting the spatial distribution of freshwater inflows to the bay. If the transfer were to occur instantly at its full amount, the impact on estuary species might be severe, particularly to oyster beds located in Trinity Bay. However, the full transition of this supply from the Trinity Basin to the San Jacinto basin is projected to occur gradually over a 40-year period, allowing sufficient time for species to migrate within the 20-mile width of Galveston Bay. Additionally, the size of the target diversion (155 cfs) is well within the current range of variation in annual flows (standard deviation over the last 20-years is just over 4100 cfs).

The Dallas-Fort Worth Metroplex is also projected to grow throughout the planning period. Wastewater return flows from that area flow into the Upper Trinity River. The Region C Water Plan recommends wastewater reuse as a management strategy for the upper basin, but it is anticipated that the upper basin will continue to provide flows to the Trinity, which will further off-set the impacts of this strategy.

Issues and Considerations

Although the supply infrastructure (Lake Livingston) is in place, the conveyance required for this transfer is not. An inter-basin pipeline or must be constructed to move this supply into the San Jacinto Basin.

Table 1
Cost Estimate for TRA to SJRA Transfer Conveyance

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 200,077,774	$ 200,077,774
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 61,598,221	$ 61,598,221
3	LAND & EASEMENTS	600	AC	$ 8,300	$ 4,980,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 3,275,000	$ 3,275,000
5	INTEREST DURING CONSTRUCTION	1	LS	$32,850,602	$ 32,850,602
					$ 302,781,597

ITEM	DESCRIPTION	ANNUAL TOTAL					
1	DEBT SERVICE	$ -	$ -	$ -	$26,397,879	$26,397,879	
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ 2,473,244	$ 2,473,244	$ 2,473,244
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ 8,230,738	$ 8,230,738	$ 8,230,738
4	PURCHASE OF WATER						
							$ 10,703,983

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	PUMP STATIONS	1	LS	$ 31,497,774	$ 31,497,774
2a	PIPELINES	1	LS	$ 168,036,000	$ 168,036,000
2b	PIPELINE CROSSINGS	1	LS	$ 544,000	$ 544,000
12	OTHER ITEMS	1	LS		$ -
					$ 200,077,774

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

Formula Basis for Estimating
Pipelines, Distribution Facilities, Tanks, & Wells O&M Cost = 0.010 * (Total Construction Cost)
Dams & Reservoirs O&M Cost = 0.015 * (Total Construction Cost)
Intake Structures & Pump Stations O&M Cost = 0.025 * (Total Construction Cost)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	PUMP STATIONS	0.025	%	$ 31,497,774	$ 787,444
2a	PIPELINES	0.010	%	$ 168,036,000	$ 1,680,360
2b	PIPELINE CROSSINGS	0.010	%	$ 544,000	$ 5,440
12	OTHER ITEMS	0.010	%	$ -	$ -
					$ 2,473,244

Table 1
Cost Estimate for TRA to SJRA Transfer Conveyance (continued)

PUMP STATIONS
CONSTRUCTION COSTS

Formula Basis for Estimating (same formula as Table uses)
Cost = 471,150 * (ln Horsepower)^2 - 1,885,353 * (ln Horsepower) + 1,305,839

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station #1	14000	HP	$ 26,248,145	$ 26,248,145
2	Pump Station #1 added Intake Structure	1	LS	$ 5,249,629	$ 5,249,629
3	Pump Station #1 added Standby Power	0	LS	$ 9,186,851	$ -
					$ 31,497,774

PIPELINES
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (Cost Tables)

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Urban Pipeline	96	26400	LF	$ 1,590	$ 41,976,000
2	Rural Pipeline	96	132000	LF	$ 955	$ 126,060,000
						$ 168,036,000

PIPELINE CROSSINGS
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (Cost Tables)

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Pipeline Crossing	96	200	LF	$ 2,720	$ 544,000
						$ 544,000

PUMP STATIONS
PUMPING ENERGY COSTS

Formula Basis for Estimating
Cost = $0.09 * 0.7457 kW/HP * 24 hrs/day * 365 days/yr * (Pump Station Horsepower)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station #1 Pumping Energy Costs	14000	HP	$ 8,230,738.32	$ 8,230,738
					$ 8,230,738

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City Of Houston/Trinity River Authority Contract Agreement

DATE: January 2, 2010

SUMMARY

STRATEGY DESCRIPTION: Surface water agreement by the City of Houston of some portion of the Trinity River Authority's water supplies from the Lake Livingston-Wallisville Salt Water Barrier system.

SUPPLY QUANTITY: Approximately 123,500 acre-feet per year

SUPPLY SOURCE: Lake Livingston-Wallisville Salt Water Barrier System

IMPLEMENTATION DECADE: 2030

TOTAL STRATEGY COST: None – water would be transferred through existing infrastructure or the Luce Bayou conveyance

UNIT WATER COST: Unknown – would be at contract rate

Water Management Strategy Analysis Description

Introduction:

Based on the Region H analysis, the Trinity River Authority (TRA) is projected to have uncommitted surface water supplies (approximately 290,000 acre-feet per year) from their water rights within the Lake Livingston-Wallisville Salt Water Barrier system through year 2060. This water supply exists as stored water located within Lake Livingston. According to the Region H water projections, there is no projected need for this water through year 2060 within the TRA service area.

Through financial considerations associated with the 1964 construction contract for the Lake Livingston-Wallisville Salt Water Barrier Project, the City of Houston (City) has a preferred position relative to purchase of uncommitted water supplies from TRA's share of the Livingston-Wallisville system. To date, the City has funded the cost of Lake Livingston including the TRA share. This strategy consists of defining that quantity of available water that could be purchased from the TRA and conveyed by the City of Houston into the San Jacinto River basin.

Analysis:

The City of Houston has sufficient water supplies to meet its own demand and current contracts through year 2050. Based on the regional planning analysis, the City will require additional supply in 2030 to meet project growth in customer WUG demands. Acquisition of some portion of the uncommitted TRA water supplies can occur through a water supply agreement executed between the City and TRA. An agreement of this type requires two willing parties. Additionally, the terms of a water agreement must be acceptable to both parties. As of the 2006 RWP, the City of Houston and TRA had initiated discussions to determine whether a water agreement could be formulated. For the current round of regional water planning, TRA is amenable to a transfer volume of 200,000 acre-feet per year including transfers to Houston and SJRA. Specific terms of the contract agreement have not been formulated at this time.

Assuming consummation of the agreement, the City of Houston has to determine how to convey these water supplies into their water supply system. Diversion of these water supplies can occur either directly from Lake Livingston or at any point downstream of Lake Livingston. Two potential diversion points and conveyance routes include use of the existing Coastal Water Authority (CWA) canal system at the Trinity River Pump Station and/or a new potential route from the Trinity River to Lake Houston via Luce Bayou. If the Luce Bayou route is utilized, then new facilities would have to be constructed which would include; a diversion structure on the Trinity River, a raw water pump station, and a conveyance pipeline and canal system. Definition of these facilities is discussed within the Luce Bayou water management strategy technical memorandum. Alternatively, it can be assumed that the Luce Bayou system is required just to provide supply to the Northeast Water Purification Plant, as is discussed within the Luce Bayou management strategy. The CWA canal system would then have sufficient excess capacity because previously utilized Lake Livingston flows would be diverted into a new Luce Bayou thereby freeing up capacity to convey up to the potential additional 200,000 acre-feet per year of supply.

Water User Group Application:

This management strategy will provide supply to meet the post-2020 demand growth for Houston's customer WUGs in Harris, Montgomery and Galveston counties.

Environmental Impact:

Additional transfer of Trinity River water supplies into the San Jacinto River basin will decrease freshwater inflows into the upper Trinity Bay estuary. Riverine flows should remain unchanged between Lake Livingston and the Coastal Water Authority diversion point. Downstream of the CWA diversion point, instream flows will decrease by approximately 3% (based upon full diversion at 276 cfs, compared to a 20-year average flow of 9100 cfs). This reduction potentially affects White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitats. Increased use of stored water from Lake Livingston may result in more frequent level fluctuations and prolonged low lake levels, which may adversely impact wetland areas along the lake perimeter. These fluctuations may also adversely affect property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

The blending of Trinity and San Jacinto river supplies in Lake Houston will affect the water quality, and could potentially introduce invasive species to Lake Houston.

Return flows from this supply (typically 60% of the total diverted) will return to Galveston Bay via the San Jacinto River and Houston Ship Channel, affecting the spatial distribution of freshwater inflows to the bay. If the transfer were to occur instantly at its full amount, the impact on estuary species might be severe, particularly to oyster beds located in Trinity Bay. However, the full transition of this supply from the Trinity Basin to the San Jacinto basin is projected to occur gradually over a 40-year period, allowing sufficient time for species to migrate within the 20-mile width of Galveston Bay. Additionally, the size of the target diversion (276 cfs) is well within the current range of variation in annual flows (standard deviation over the last 20-years is just over 4100 cfs).

The Dallas-Fort Worth Metroplex is also projected to grow throughout the planning period. Wastewater return flows from that area flow into the Upper Trinity River. The Region C Water Plan recommends wastewater reuse as a management strategy for the upper basin, but it is anticipated that the upper basin will continue to provide flows to the Trinity, which will further off-set the impacts of this strategy.

Issues and Considerations:

Although the supply infrastructure (Lake Livingston) is in place, the conveyance required for this transfer is not. The Luce Bayou transfer must be constructed to move this supply into the San Jacinto Basin. See the Luce Bayou Transfer technical memorandum for a discussion of those costs and impacts.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: WUG Contracts

DATE: November 17, 2009

SUMMARY

STRATEGY DESCRIPTION: Contractual agreements for water from WWPs to WUGs. Water for contracts would come from multiple sources, including other water management strategies (WMS).

SUPPLY QUANTITY: Varies by WUG

SUPPLY SOURCE: Varies by WUG

IMPLEMENTATION DECADE: Varies by WUG

TOTAL STRATEGY COST: Varies by conveyance – total estimated infrastructure cost of $2,390,273,157 associated with contractual volumes for all WUGs.

UNIT WATER COST: NA – based on contractual agreement

Water Management Strategy Analysis Description

Introduction:

Previous RWPs have reflected major WMS largely at the end-user (WUG) level. However, water reaching the WUG level from major management strategies may involve the facilities and services of one or more wholesale water providers (WWPs). A series of contractual agreements is necessary for water from WMSs to move from the sourer location to ultimate user. For example, the TRA to Houston Transfer strategy may involve the contractual transfer of water from TRA to the City of Houston, from the City of Houston to a smaller WWP, and finally from the smaller WWP to the WUG. Note that WWP and WUGs are not obligated by the RWP to increase existing contracts or enter into new contracts. Any additional contract amounts will require negotiation between the WUG and WWP. The "Expand/Increase Current Contracts" WMS indicates a contractual transfer of supplies from WWP to a WUG where there is an existing supply shown from the same WWP and source to the WUG. "New Contract from Existing Supply" indicates a contractual transfer from WWP to WUG where there is not already an existing supply an existing supply shown from the same WWP and/or source to the WUG. Both of these WMS are functionally identical and reflect contractual transfer of existing supplies rather than of new strategy water.

Analysis:

WWP to WUG Contracts are shown in Table 4A-8 in Appendix 4A.

Water User Group Application:

Contracts facilitate transfer of water from WWPs to WUGs.

Issues and Considerations:

The proper functioning of other WMS is contingent on contracts between WWPs and WUGs.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: WWP Contracts

DATE: November 14, 2009

SUMMARY

STRATEGY DESCRIPTION: Contractual agreements for water between WWPs. Water for contracts would come from multiple sources, including other water management strategies (WMS).

SUPPLY QUANTITY: Varies

SUPPLY SOURCE: Varies

IMPLEMENTATION DECADE: Varies

TOTAL STRATEGY COST: Varies by conveyance

UNIT WATER COST: NA – based on contractual agreement

Water Management Strategy Analysis Description

Introduction:

Previous RWPs have reflected major WMS largely at the end-user (WUG) level. However, water reaching the WUG level from major management strategies may involve the facilities and services of one or more wholesale water providers (WWPs). A series of contractual agreements is necessary for water from WMSs to move from the sourer location to ultimate user. For example, the TRA to Houston Transfer strategy may involve the contractual transfer of water from TRA to the City of Houston, from the City of Houston to a smaller WWP, and finally from the smaller WWP to the WUG. Thus, WWP contracts necessary to facilitate other WMS are included as a management strategy with no yield of its own. Note that WWP and WUGs are not obligated by the RWP to increase existing contracts or enter into new contracts. Any additional contract amounts will require negotiation between the WWPs.

Analysis:

Contracts between WWPs required to facilitate other WMS are shown in Table 1 below. Note that this list does not include contracts from WWPs directly to WUGs.

Table 1
WWP Contracts (ac-ft/yr)

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
BRA to Brazosport Water Authority						
ALLENS CREEK	0	116	124	1,557	3,183	5,435
TOTAL	0	116	124	1,557	3,183	5,435

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
BRA to GCWA						
ALLENS CREEK	0	12,165	27,627	31,782	37,777	42,624
BRA SYSTEM OPERATIONS PERMIT	0	1,290	8,057	14,099	14,099	14,099
FORT BEND OCR	0	0	0	0	0	4,517
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM[1]	0	4,324	4,324	4,324	4,324	4,324
TOTAL	0	17,779	40,008	50,205	56,200	65,564
BRA to NRG						
FORT BEND OCR	0	0	0	0	0	8,500
TOTAL	0	0	0	0	0	8,500
BRA to Richmond-Rosenberg						
ALLENS CREEK	0	0	0	1,091	2,970	1,848
FORT BEND OCR	0	0	0	0	90	3,797
TOTAL	0	0	0	1,091	3,060	5,645
BRA to Sugar Land						
BRA SYSTEM OPERATIONS PERMIT	0	1,027	2,947	3,385	3,385	3,385
ALLENS CREEK	0	0	0	231	490	449
FORT BEND OCR	0	0	0	0	0	922
TOTAL	0	1,027	2,947	3,616	3,875	4,756
COH to Baytown Area Water Authority						
LIVINGSTON-WALLISVILLE SYSTEM	0	26	262	398	535	692
TOTAL	0	26	262	398	535	692
COH to BRA						
ALLENS CREEK	0	27,498	25,201	57,886	69,755	69,755
TOTAL	0	27,498	25,201	57,886	69,755	69,755
COH to CHCRWA						
HOUSTON LAKE/RESERVOIR	0	977	862	720	631	546
LIVINGSTON-WALLISVILLE SYSTEM	0	794	1,552	1,711	1,800	1,885
TOTAL	0	1,771	2,414	2,431	2,431	2,431
COH to City of Pasadena						
LIVINGSTON-WALLISVILLE SYSTEM	1,865	2,278	2,665	3,153	3,579	4,068
TOTAL	1,865	2,278	2,665	3,153	3,579	4,068

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
COH to North Channel Water Authority						
LIVINGSTON-WALLISVILLE SYSTEM	1,954	2,392	2,869	3,511	4,157	4,912
TOTAL	1,954	2,392	2,869	3,511	4,157	4,912
COH to NFBWA						
LIVINGSTON-WALLISVILLE SYSTEM	0	444	17,971	31,161	41,172	50,442
TOTAL	0	444	17,971	31,161	41,172	50,442
COH to NHCRWA						
HOUSTON LAKE/RESERVOIR	0	30,880	30,880	32,734	29,030	25,398
HOUSTON INDIRECT REUSE	0	0	0	18,130	31,629	0
LIVINGSTON-WALLISVILLE SYSTEM	0	25,573	52,161	32,177	17,382	57,643
TOTAL	0	56,453	83,041	83,041	78,041	83,041
COH to SJRA						
CONROE LAKE/RESERVOIR	0	36,377	55,538	54,582	53,581	52,534
TOTAL	0	36,377	55,538	54,582	53,581	52,534
COH to WHCRWA						
LIVINGSTON-WALLISVILLE SYSTEM	1,241	31,837	46,324	52,759	55,549	58,402
TOTAL	1,241	31,837	46,324	52,759	55,549	58,402
GCWA to City of Galveston						
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	0	677	677	677	677	677
BRAZOS RIVER RUN-OF-RIVER	0	5,360	5,360	5,360	5,360	5,360
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	0	1,225	1,225	1,225	1,225	1,225
TOTAL	0	7,262	7,262	7,262	7,262	7,262
GCWA to Fort Bend County WCID #2						
BRA SYSTEM OPERATIONS PERMIT	0	491	1,092	1,092	1,092	1,092
TOTAL	0	491	1,092	1,092	1,092	1,092
GCWA to Galveston County WCID #1						
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	0	59	59	59	59	59
BRAZOS RIVER RUN-OF-RIVER	0	469	469	469	469	469
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	0	107	107	107	107	107
ALLENS CREEK	0	131	274	305	340	379
FORT BEND OCR	0	0	0	0	0	0
TOTAL	0	766	909	940	975	1,014

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
GCWA to Missouri City						
ALLENS CREEK	0	0	68	321	571	594
BRA SYSTEM OPERATIONS PERMIT	0	713	6,262	10,340	10,340	10,340
FORT BEND OCR	0	0	0	0	0	4,501
TOTAL	0	713	6,330	10,661	10,911	15,435
SJRA to COH						
HOUSTON LAKE/RESERVOIR	0	0	1,356	5,300	3,872	2,428
TOTAL	0	0	1,356	5,300	3,872	2,428
TRA to COH						
LIVINGSTON-WALLISVILLE SYSTEM	0	0	116,738	123,524	123,524	123,524
TOTAL	0	0	116,738	123,524	123,524	123,524
TRA to SJRA						
LIVINGSTON-WALLISVILLE SYSTEM	0	0	0	7,935	39,096	76,476
TOTAL	0	0	0	7,935	39,096	76,476

[1]Reflects water already contracted but unused prior to water treatment expansion

Water User Group Application:

Contracts facilitate transfer of water among WWPs for ultimate delivery to WUGs.

Issues and Considerations:

The proper functioning of other WMS is contingent on contracts between the proper WWPs.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Expanded Use of Groundwater

DATE: July 20, 2010

SUMMARY

STRATEGY DESCRIPTION: Increased use of existing groundwater supplies, within the limits of the sustainable yield, groundwater reduction plan limitations or groundwater conservation district rules.

SUPPLY QUANTITY:

County (Aquifer):	Projected Increase from 2010 to 2060 (acre-feet/year)
Austin (GC)	1,865
Brazoria (GC)	16,209
Chambers (GC)	1,010
Fort Bend (GC)	4,413
Galveston (GC)	1,352
Harris (GC)	27,550 (maximum in 2050)
Leon (CW, SP, QC)	908
Liberty (GC)	12,388
Madison (CW, SP, QC)	450
Montgomery (GC)	11,820
Polk (GC)	513
San Jacinto (GC)	1,060
Trinity (GC)	36 (in 2020, demands decline in 2030 – 2060)
Walker (GC, SP, YJ)	2,843
Waller (GC)	7,431

SUPPLY SOURCE: Gulf Coast (GC), Carrizo-Wilcox (CW), Sparta (SP), Queen City (QC), and Yegua-Jackson Aquifers (YJ).

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $589,500 per typical 1 mgd well (1,000 ft deep) – total infrastructure capital cost share associated with this WMS is $165,929,000. (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $205 per acre-foot (average, treated and delivered)

Water Management Strategy Analysis Description

Introduction:

The Region H Water Plan anticipates the continued use of available groundwater to meet demands, unless such use is limited by groundwater conservation district rules or local water quality concerns. By fully utilizing this supply, the diversion and movement of surface water can be minimized. Groundwater use from the Gulf Coast, Carrizo-Wilcox, Sparta, Queen City, and Yegua-Jackson Aquifers is projected to increase in certain counties during the planning period, and this increased use is reflected in Chapter 3, Available Water Supplies. However, the additional wells and related infrastructure required to obtain this water must be reflected in the plan as a management strategy.

Water User Group Application:

Expanded use of groundwater is recommended as a management strategy in all counties where increased use is projected. This expanded use is subject to local subsidence or groundwater conservation district rules and permitting practices. The RHWPG recognizes that Harris, Galveston and Fort Bend Counties have groundwater reduction plans that will result in decreasing groundwater use during the planning period. However, it is anticipated that many existing wells will continue to be used in conjunction with surface water to serve certain areas or to meet peak day demands. Three counties in the region (Fort Bend, Galveston and Harris) are projected to decrease their use of groundwater during the planning period due to Groundwater Reduction Plans enacted by the local Subsidence Districts. However, within these counties new wells will still be constructed and existing wells maintained or replaced in areas where surface water is not yet available, or where groundwater remains a portion of the overall community supply.

Issues and Considerations:

This expanded use of groundwater is not anticipated to have significant environmental effects. Groundwater within the region is generally of good quality and available at the point of use, allowing the wells and conveyance systems to be commingled with the supported development, and not requiring substantial additional land for well fields or conveyance systems. Site-specific evaluations of wildlife habitats, wetlands (including mitigation by wetlands off-sets) and cultural resources must be considered in the overall development plan. There are no major springs in Region H, but well pumping supplies return flows to all river basins within the region, and ultimately to Galveston Bay. These flows will increase proportionally with the increased groundwater use, unless or until reuse strategies are implemented. The expanded use is within the estimated sustainable yield of the Gulf Coast, Carrizo-Wilcox, Sparta, Queen City and Yegua-Jackson Aquifers, making it a preferred alternative to moving and treating additional surface water. Surface water diversions may reduce in-stream flows during drought periods, potentially affecting aquatic and riparian wildlife species. The costs for expanded use of groundwater will vary slightly from site to site, but it may generally be assumed that a 1 mgd well will cost approximately $589,500 to construct. If the total increase in groundwater demand for a WUG is less than one-quarter mgd (280 acre-feet/year), it can be assumed to be met by increased pumping of existing wells. All wells are assumed local, within a nominal 1-mile radius of the intended point of use, due to the extent of the Gulf Coast Aquifer under the region.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Interim Strategies

DATE: November 13, 2009

SUMMARY

STRATEGY DESCRIPTION: Increased use of existing groundwater supplies beyond projected availability or allowable pumpage on a temporary basis to meet 2010-2019 shortages for Brazoria, Chambers, and Montgomery Counties for manufacturing and municipal needs. In Galveston and Harris Counties, the over-pumping of groundwater is not a feasible alternative in 2010. However, other options exist for short-term supplies to these WUGs with groundwater supplies

SUPPLY QUANTITY:

County:	Volume (acre-feet/year)
Brazoria	24,916
Chambers	903
Galveston	6,410
Harris	15
Montgomery	13,268

SUPPLY SOURCE: Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $86,701,500 capital cost for all implementing WUGs (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $788 per acre-foot average cost (varies by WUG), interim groundwater

Water Management Strategy Analysis Description

Introduction:

Demand projections from the 2011 Planning Round for Region H indicate Year 2010 shortages for over 150 WUGS. For a majority of these WUGs, near-term needs can be met through conservation, expansion of current contracts, and expansion of groundwater use within groundwater conservation district rules and groundwater reduction plan limits, or ongoing small local projects. However, for 55 WUGs in Brazoria, Chambers, Harris, Galveston, and Montgomery Counties, there is no management strategy available in 2010 to meet needs.

One potential option available to meet the near-term shortages anticipated for these WUGs is interim pumping of groundwater above regulated limits. After 2020, the interim groundwater strategy will not be needed as other management strategies will be available to meet demands. In Brazoria, Chambers, and Montgomery Counties, there is no regulation in place for the year 2010 that prevents the sue of additional groundwater on a limited basis to meet these needs before other strategies can be developed.

In Harris and Galveston Counties, the shortage in 2010 can not be easily made up with additional groundwater usage. Regulated groundwater pumpage in the areas experiencing these near-term shortages is limited to 10 percent of total demand. Exceeding this limit under extreme demand scenarios considered in this plan would violate the Harris-Galveston Subsidence District regulatory plan. However, other options may exist for these WUGs. Typically, WUGs in this region convert to a point that meets less than 10 percent of their demand from groundwater. This over-conversion provides for conversion credits that may be used to offset excess pumping in later years and provide an optional source of supply for these WUGs until strategies can be implemented in the 2020 decade.

Water User Group Application:

Interim groundwater pumping is recommended as a management strategy in counties where 2010 needs cannot be met by another water management strategy. This additional pumping would not be expected to occur on a constant basis through 2019 but rather would only occur during dry conditions coinciding with peak demands. Between dry periods, pumping would return to normal levels, allowing aquifer recovery. In the event of prolonged near-term drought, additional groundwater wells may be required for some WUGs in order to increase pumping capacity. For WUGs with excess pumping capacity, this strategy would not include a capital cost.

Issues and Considerations:

Impacts of this strategy have not been investigated in detail. Under prolonged drought conditions, the pumping of groundwater in excess of sustainable levels would be expected to create a decline in static water levels. There is also the potential for some subsidence depending on the location and volume of interim groundwater use.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: New Groundwater Wells for Livestock

DATE: November 11, 2009

SUMMARY

STRATEGY DESCRIPTION: Development of new groundwater wells to meet livestock needs in Brazoria and Galveston County

SUPPLY QUANTITY:

County:	Volume (acre-feet/year)
Brazoria	27
Galveston	14

SUPPLY SOURCE: Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $18,635

ANNUAL UNIT WATER COST: $37 per acre-foot average

Water Management Strategy Analysis Description

Introduction:

Demand projections from the 2011 Planning Round for Region H indicate Year 2010 shortages for Livestock in Brazoria County (San Jacinto-Brazos Basin) and Galveston County (Neches-Trinity Basin). These Livestock WUGs are dependent on local livestock supply (stock ponds) as well as groundwater from the Gulf Coast Aquifer. The only management strategy feasible for these two WUGs is development of additional groundwater pumping capacity.

Water User Group Application:

New groundwater wells are recommended as a management strategy for Livestock in Brazoria County (San Jacinto-Brazos Basin) and Galveston County (Neches-Trinity Basin). This additional pumping is within the projected availability of the aquifer for the Galveston County Livestock WUG; the Brazoria County Livestock WUG need exceeds groundwater availability by 27 acre-feet per year in 2020.

Issues and Considerations:

Impacts of this strategy have not been investigated in detail. Effects of exceeding projected groundwater availability for Brazoria County in 2020 are expected to be small, as the overpumping is 0.08 percent of the total local groundwater availability.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Missouri City GRP

DATE: November 30, 2009

SUMMARY

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the City of Missouri City Joint Ground Water Reduction Plan (GRP) will reduce ground water use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 3,392 AFY in 2013 and 15,844 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE:	30% reduction – 2013 60% reduction – 2025

TOTAL STRATEGY COST: (Costs rounded to nearest $100)	$1,281,500 to $2,301,800 annual operation cost $51,260,490 capital cost, Phase I surface water plant and transmission $40,810,500 capital cost, Phase II surface water plant

ANNUAL UNIT WATER COST: $378 per ac-ft (WWP cost only for Region H allocated SW volumes - excludes infrastructure cost of customer WUGs / GRP participation)

Water Management Strategy Analysis Description

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The City of Missouri City has 24 active Utility Districts operating in the City Limits/Extra Territorial Jurisdiction (ETJ), 19 of which operate within the City limits. In addition, the City has 11 Utility Districts within the City Limits/ETJ that are not yet active, but will become active in the future. The Joint GRP brings together the city and 40 other entities. The entities included in the Joint GRP are listed in Table 1.

Table 1
Participants in GRP

WUG Name	Listed as a WUG in Regional Water Plan
City of Missouri City	Yes
Blue Ridge West MUD	No
Estates of Silver Ridge	No
First Colony MUD No. 9	Yes
Fort Bend County MUD No. 23	Yes
Fort Bend County MUD No. 24	No
Fort Bend County MUD No. 26	No
Fort Bend County MUD No. 42	No
Fort Bend County MUD No. 46	No
Fort Bend County MUD No. 47	No
Fort Bend County MUD No. 48	No
Fort Bend County MUD No. 49	No
Fort Bend County MUD No. 115	No
Fort Bend County MUD No. 129	No
Fort Bend County MUD No. 149	No
Lake Olympia	No
Lake Shore Harbour	No
Manors of Silver Ridge POA	No
Meadow Creek MUD	No
Mustang Bayou Phase I	No
Mustang Bayou Phase II	No
Palmer Plantation MUD No. 1	No
Palmer Plantation MUD No. 2	No
Quail Valley Utility District	No
Riverstone	No
Sienna Point	No
Sienna Plantation MUD No. 1	No
Sienna Plantation MUD No. 2	Yes
Sienna Plantation MUD No. 3	No
Sienna Plantation MUD No. 4	No
Sienna Plantation MUD No. 5	No
Sienna Plantation MUD No. 6	No
Sienna Plantation MUD No. 7	No
Sienna Plantation MUD No. 8	No
Sienna Plantation MUD No. 10	No
Sienna Plantation MUD No. 12	No
Sienna Plantation MUD No. 13	No
Sienna Plantation POA	No
Sienna Plantation RAI	No
Silver Ridge HOA	No
Thunderbird Utility District	No
Waterbrook Community Association	No

Analysis:

The Joint GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The City is partnering in this endeavor with 40 other entities. These participants include mostly entities lying within the city limits of Missouri City as well as some entities within the City's ETJ and outlying areas. All wells of the stakeholders will be aggregated to expedite the administrative process of administrating the plan.

Population projections and subsequent water demand projections were made for each individual stakeholder group based on current build-out density, City planning documents, and acreage estimates.

The Missouri City Joint GRP will meet these requirements through the conversion of some entities, largely those lying to the southern portion of the City and its ETJ entirely to surface water, while most entities lying to the northern portion of the City will remain on ground water supplies. The basic philosophy associated with this conversion plan is that those entities in the area are also largely undeveloped. This should limit the cost impact associated with abandoning groundwater infrastructure upon conversion. Additionally, this plan considers that there are few interconnections within the built-out entities, thereby making it quite difficult to provide surface water to these entities without the construction of an entirely new transmission system throughout the City.

As the converting entities are not yet built-out, there is some risk associated with this plan, as the City is still required to meet the conversion percentages outlined by the Subsidence District, regardless of whether growth projections occur. As a contingency, the City has entered into inter-local agreements with every participant on the system requiring them to convert to surface water if and when directed by the City. The City would convert entities one by one beginning in the southern portion of the City, and working in a generally northerly direction.

Initial raw supplies would be obtained through a pre-existing agreement the City of Missouri City has with the Gulf Coast Water Authority (GCWA). The City is currently identifying additional sources of raw water.

The City will own and operate the plant. Further, the City of Missouri City has been appointed the GRP administrator. As the GRP administrator, among other things, the City will see that the overall project is meeting conversion requirements, is providing required reporting to the Subsidence District and will also oversee the financial cost sharing program of the project. The cost share program involves an annual calculation of a pumpage fee to be assessed to each participant based on their respective groundwater pumpage. An end of the year “true-up” will be performed to assure that no single one entity would bear any more risk than the other participating entities.

Based on current demand projections the initial plant will have a design capacity of 10 MGD and employ membrane filtration technology. The plant will be located on the Briscoe canal in the southern portion of the Joint GRP service area near the Gulf Coast Water Authority existing intake structure on the Brazos River. From this point, treated water will be delivered to the converting entities existing ground storage facilities.

Water User Group Application:

The City of Missouri City Joint GRP has starting implementation of this strategy, specifically construction of the surface water treatment plant. The initial plant size will be 10 MGD, which is projected to meet the City’s required maximum demand through 2018, at which time the plant will be expanded to its ultimate capacity. The GRP also includes reuse and aquifer storage and recovery.

Issues and Considerations:

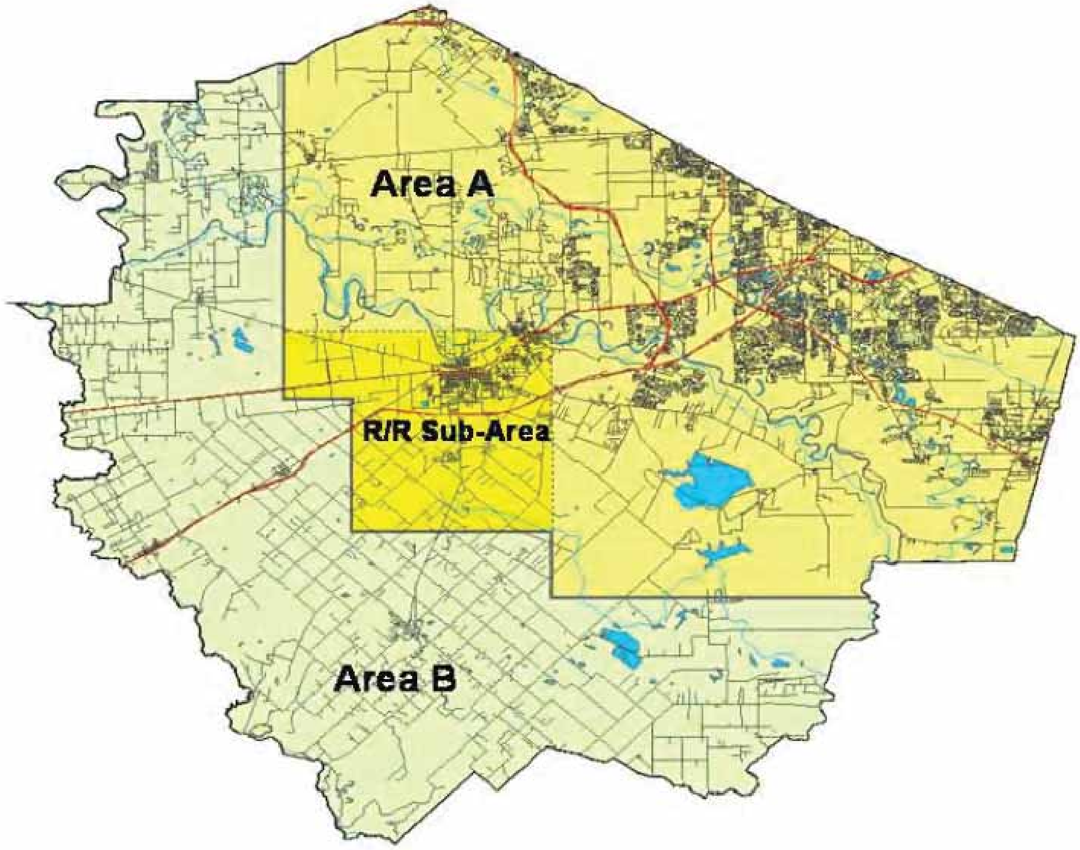
In Fort Bend County, the potential reduction in groundwater demand may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the City of Missouri City Joint GRP. One of the impacts associated with the strategy outlined herein or that may result from implementation of the water management strategy is the increase in permitted GCWA diversions. Otherwise the water management strategy should produce minimal environmental impacts.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

City of Missouri City Joint Groundwater Reduction Plan, City of Missouri City, October 30, 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend Municipal Utility District No. 25 GRP
DATE: November 22, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Fort Bend Municipal Utility District No. 25 (MUD 25) Ground Water Reduction Plan (GRP) will reduce ground water use by implementing reuse. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Reuse volume of up to 589 AFY

SUPPLY SOURCE: Reuse of WWTP discharge

IMPLEMENTATION DECADE: 30% reduction – 2013
60% reduction – 2025

TOTAL STRATEGY COST: $776,100 capital cost (estimated as $564 per acre-foot of plant capacity based on Wastewater Reuse for Municipal Irrigation WMS). (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $499 per acre-foot based on assumption above.

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

MUD 25 is partnering with the Shadow Hawk Golf Course and the Orchard Lakes Development for purposes of meeting the required groundwater reduction. Effluent from Mud 25's WWTP will be used for irrigation and filling of amenity lakes in the Shadow Hawk Golf Course and the Orchard Lakes Development instead of existing groundwater wells.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. MUD 25 is partnering in this endeavor with Shadow Hawk Golf Course and the Orchard Lakes Development (the Group).

Historical groundwater use, along with per-capita usage rates and growth projections, were analyzed. Reuse potential was analyzed using a best case (low demand, high reuse availability), worst case (high demand, low reuse availability) and realistic scenario. Under worst case conditions, surface water conversion would be required beginning in 2015 and over-conversion credits would be depleted by 2029, requiring an additional 100 million gallons of surface water conversion credits per year beginning in 2029. For the best case scenario, over-conversion and other credits would meet requirements through 2030, with no need for surface water conversion. For the realistic case, surface water conversion credits would have to begin in 2026 for FBSD requirements to be met through 2030. Surface water credit requirements will be re-examined five years prior to the projected surface water conversion for the realistic scenario. MUD 25 also has surface water conversion credit agreements with the City of Sugar Land. The MUD also has a backup provision to participate in the regional surface water plant in west Fort Bend County. The district also participates in conservation education measures.

Water User Group Application:

MUD 25 has started implementation of this strategy, with reuse beginning in January 2008. Between January and October of 2008, over 142 million gallons (436 acre-feet) of water has been reused by the GRP participants.

Issues and Considerations:

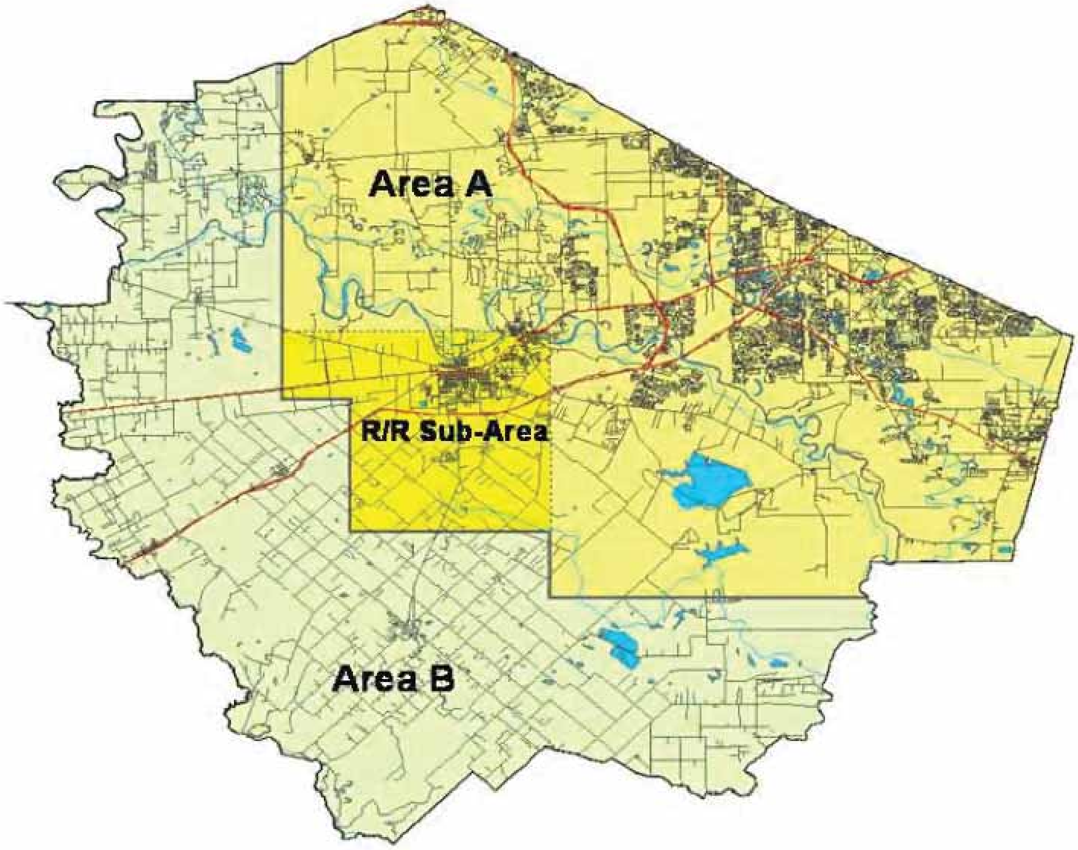
The timing of surface water credit accumulation depends on general trends in irrigation / amenity lake demands and reuse availability, which will be driven largely by weather conditions.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Groundwater Reduction Plan, Fort Bend County MUD No. 25, October 30, 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Pecan Grove GRP

DATE: November 11, 2009

SUMMARY

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Pecan Grove Municipal Utility District Ground Water Reduction Plan (GRP) will reduce ground water use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 866 AFY in 2013 and 1,731 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE: 30% reduction – 2013
60% reduction – 2025

TOTAL STRATEGY COST: $442,000 - $884,000 annual operating cost
(Costs rounded to nearest $100) $15,960,000 capital cost, treatment plant and transmission

ANNUAL UNIT WATER COST: $865 per acre-foot

Water Management Strategy Analysis Description

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

Pecan Grove Municipal Utility District (MUD) GRP includes two participants: Pecan Grove MUD and the Pecan Grove Plantation Country Club (PGPCC), which is entirely within the MUD. Note that PGPCC is not a separate named WUG and hence its demands are included with Pecan Grove MUD.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for the mandated deadlines for partial conversion to non-groundwater sources. The MUD is partnering in this endeavor with PGPCC, representing a total of two individual wells and five private wells. Water demand projections for the MUD show only slight growth, due to near build-out conditions.

The Pecan Grove MUD GRP will meet these requirements through the construction of a surface water treatment plant (SWTP) with sufficient capacity to meet conversion requirements for the MUD and

PGPCC through 2030; existing distribution infrastructure will be used for delivery to customers. Pecan Grove MUD has obtained an annual raw water supply agreement from the Brazos River Authority to provide source water to the SWTP. The existing groundwater supply system will be maintained and operated to meet demands in excess of the SWTP capacity. The MUD will continue the use of reclaimed effluent for process and cleaning water. The MUD will also, at the discretion of the Pecan Grove MUD Board of Directors, continue public education in water conservation.

Water User Group Application:

The Pecan Grove MUD GRP has started implementation of this strategy with source water testing and site acquisition shown as scheduled fort 2008. SWTP design and permitting are schedule to be completed in 2010. Construction of the SWTP and conversion of existing disinfection facilities to chloramines are scheduled for completion by 2013. The GRP-proposed measures have the potential to reduce shortages by 866 AFY in 2013 and 1,731 AFY in 2025. The initial plant size will be 2 MGD, which is projected to meet the City's required maximum demand through 2030.

Issues and Considerations:

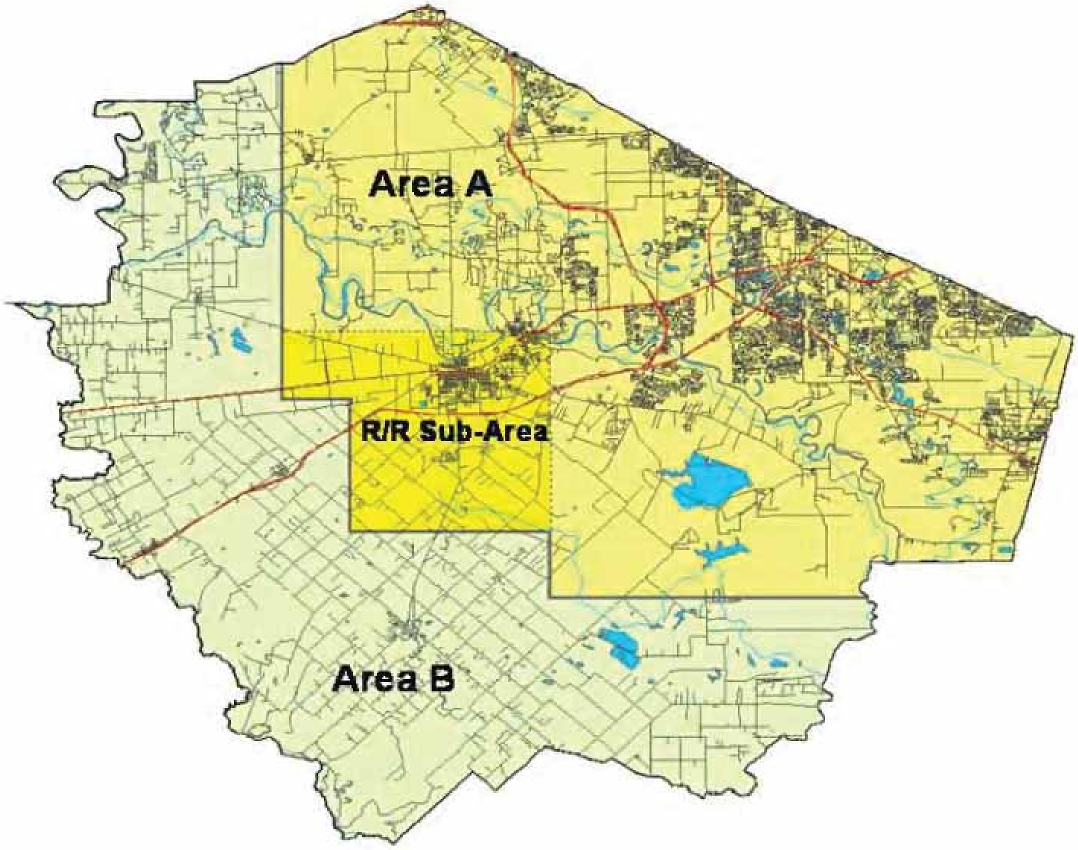
In Fort Bend County, the potential reduction in groundwater demand may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the GRP Participants.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Pecan Grove Municipal Utility District Groundwater Reduction Plan, Pecan Grove MUD, October 2007

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Richmond and Rosenberg GRP

DATE: November 23, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Sugar Land Coalition will reduce groundwater demands by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages and reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: 7,500 afy (reflected as an existing contract supply in database)

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 30% reduction – 2013
60% reduction – 2025

TOTAL STRATEGY COST: $4,136,000 - $15,006,000 annual operation cost
(Costs rounded to nearest $100) $43,205,000 capital cost, Phase I (2015)
$29,963,000 capital cost, Phase II (2025)
$29,898,000 capital cost, Phase III (2033)
$14,153,000 capital cost, Phase IV (2052)

ANNUAL UNIT WATER COST: $1,491 per ac-ft for existing 7,500 ac-ft contract

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a Groundwater Reduction Plan (GRP) which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The Cities of Richmond and Rosenberg, in conjunction with Fort Bend County MUD No. 25, are participating in a planned West Fort Bend County Regional Surface Water Treatment Plant (WFB SWTP).

Analysis:

The preliminary engineering report (PER) for the WFB SWTP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The Cities of Richmond and Rosenberg, in conjunction with Fort Bend County MUD No. 25, are participating in the planned WFB SWTP. Plant sizing was governed by the need to meet at least the minimum reduction in groundwater usage required by FBSD rules. Several scenarios were considered, including a base condition (each utility taking their required volume at their defined take point), overconversion of the Pecan Grove MUD service area (no longer a participating entity), overconversion of the Richmond-Rosenberg service area, and a two-plant scenario. Subsequent to Pecan Grove MUD no longer participating in the joint plant development, the most likely scenario is a single southern plant serving Richmond and Rosenberg. Initial plant capacity would be 4 MGD, increasing to 16 MGD over the course of several expansion phases. The plant facility is intended to serve the Richmond-Rosenberg area through 2065.

Issues and Considerations:

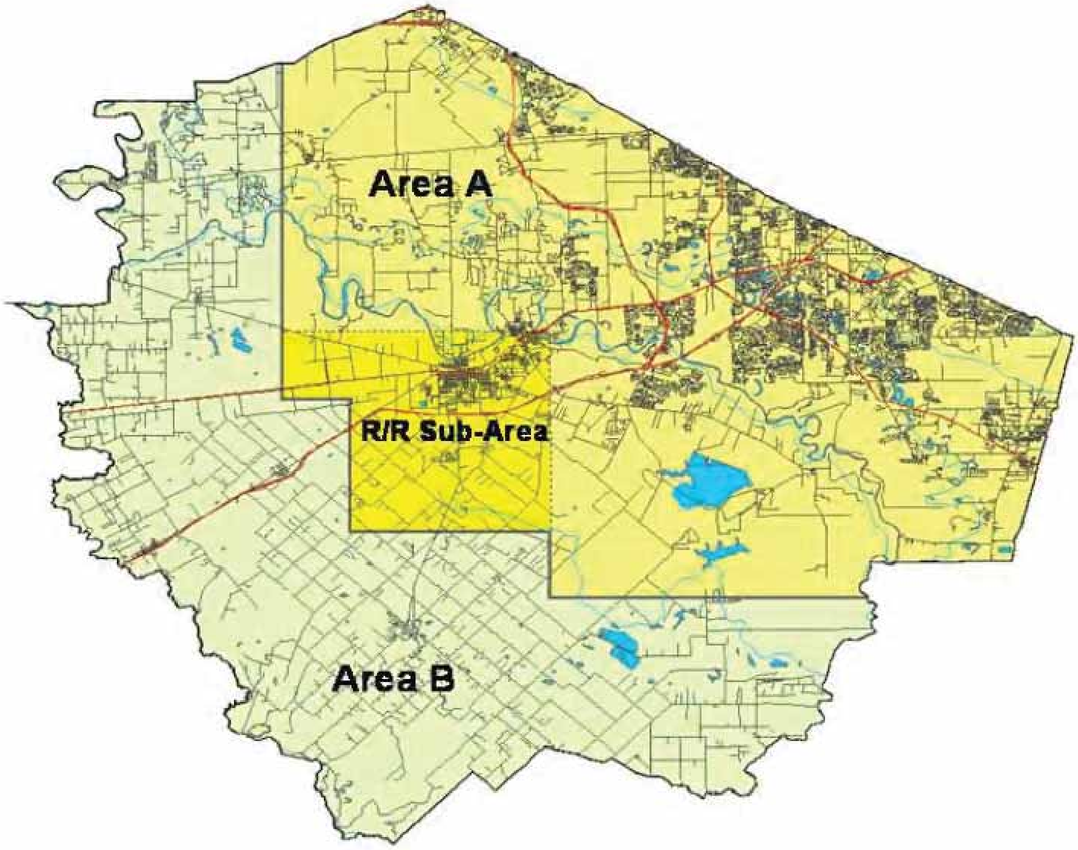
Critical path items for implementation of the WFB SWTP described in the preliminary engineering report include contract development, land purchase for facilities, raw water quality sampling, and evaluation of RO concentrate disposal options.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

West Fort Bend County Regional Surface Water Treatment Plant – Preliminary Engineering Report, July 2007.

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: San Jacinto River Authority- Water Resources Assessment Plan[1]

DATE: July 9, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Conversion from existing groundwater supplies to new surface water supplies to meet current and future water demands within Montgomery County and reduce overreliance on insufficient groundwater supplies.

SUPPLY QUANTITY: 20,164 ac-ft/yr (18 mgd) – 129,010 ac-ft/yr (115 mgd) Supply includes 52,534 ac-ft/yr from SJRA WRAP (Lake Conroe Supply) and additional 76,476 TRA to SJRA Contract (Lake Livingston Supply).

SUPPLY SOURCE: Lake Conroe Surface Water

TOTAL STRATEGY COST[2]: $900,000,000 capital cost (Costs rounded to nearest $100)

UNIT WATER COST: $649 per acre-foot

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION
The purpose of this analysis is to incorporate the San Jacinto River Authority's Joint Water Resources Assessment Plan as a water management in the development of new surface water supplies within the Region H Planning Group.

ANALYSIS

Scientific studies conducted by the Lone Star Groundwater Conservation District (LSGCD) have shown that the demand for groundwater in many areas within Montgomery County is exceeding the sustainable yield of the aquifers, and is leading to alarming declines in water level throughout the county. Modeling of future population and water demand has shown that this continued reliance on groundwater would lead to significant problems for water suppliers within the county as well as continued water level decline in aquifers.

In an effort to meet a larger portion of the county's water demand with surface water, allowing for the decrease in use and reliance on groundwater, the LSGCD adopted the District Regulatory Plan (DRP) "to create a regulatory framework for the District to responsibly regulate and conserve the use of groundwater in Montgomery County. The DRP requires Large Volume Groundwater Users (LVGU) to conduct long-term planning in order to assess their future water needs, and to describe how they will obtain alternative water supplies such that future demands can be met whilst adhering to groundwater reduction requirements adopted by the LSGCD. The DRP established an aquifer sustainable yield of 64,000 acre-feet per year, and requires groundwater use to be reduced to this annual volume by January of 2015.

[1] This memorandum was prepared using information in the *Joint Water Resources Assessment Plans* prepared by Brown & Gay for the San Jacinto River Authority.

The LVGUs are defined as entities that produce over 10 million gallons per year, but exclude single family residences and agricultural use of water. There are 201 LVGUs in Montgomery County and include everything from large municipal systems to smaller public and private utilities, as well as individual industries, businesses, golf courses, and homeowner associations. Of these 201 LVGUs, 197 are participating in the SJRA Joint Wrap, leaving Conroe Country Club, Wedgewood Golf Course, River Plantation MUD, and the City of Houston to develop and submit their own WRAPs.

As the DRP established a single management zone which encompasses the entire county, a group participation approach has been used in order to efficiently meet reduction requirements established by LSGCD. In an effort to fully utilize the economic benefits of regionalization and economies of scale, the San Jacinto River Authority (SJRA) developed a Joint Water Resources Assessment Plan (WRAP) and offered participation and inclusion to all LVGUs within the county. The key benefit of combining individual users' projected water demands into a regional WRAP is the ability to achieve tremendous cost savings by utilizing a "group compliance" concept in which some participants are partially of fully converted to surface water while other participants remain on groundwater supplies. As a group, the participants can cost-effectively meet the regulatory requirements of the LSGCD by over converting the more densely populated areas to an alternative water supply while more sparsely populated areas remain on groundwater, avoiding the costly necessity of physically delivering alternative supplies to every participant.

Population and Demand Projections

Population projections in the Joint WRAP were initially derived by comparing both Texas Water Development Board (TWDB) and Houston-Galveston Area Council (HGAC) population projections. While both data sources have traditionally underestimated growth in Montgomery County, the HGAC projections (which are done at a regional as opposed to state level) have been more accurate in projecting population growth. However, the LSGCD DRP requires that population (and therefore demand) projections be from the TWDB. Therefore, in accordance with the LSGCD DRP, as well as to align with the Region H population projections, projections for countywide total population are constrained using the Region H/TWDB numbers. **Table 1** below presents the population and water demand projections for Montgomery County.

Table 1
Montgomery County Population and Water Demand Projections

	2015	**2025**	**2035**	**2045**
Population	479,872	617,300	775,479	967,800
Demand (Acre-Feet/Year)	89,546	113,716	137,435	166,175

Region H demand projections were used for estimating Montgomery County total demand through 2045. Further analysis was conducted in the Joint WRAP to estimate the individual contributions of both participants and non-WRAP participants.

Table 2 below shows total water demand for SJRA Joint WRAP Participants, and is based on Region H/TWDB projections. The projected water demand for existing and future Joint WRAP Participants exceeds 99% of the total county demand throughout the planning period.

Table 2
Total Water Demand for SJRA and WRAP Participants

	Demand (Acre-Feet/Year)				
	2007	**2015**	**2025**	**2035**	**2045**
Existing and Future Participant Demand	70,385	89,209	113,290	136,877	165,453
Non-WRAP Participants*	248.0	333.5	426.0	557.5	722.0
TOTAL COUNTY DEMAND	**70,633**	**89,543**	**113,716**	**137,435**	**166,175**

*Represents City of Houston, Conroe Country Club, and Wedgewood Golf Course. River Plantation MUD has elected not to participate in the SJRA WRAP after the publication of the SJRA WRAP Part II, and is included in "Existing and Future Participant Demand".

Similar to planning conducted by Region H, unit demand is assumed to decrease over time due to future changes in technology, water use management, and conservation efforts. Unit demand decreases by roughly 2% over each ten year period from 2015 to 2045.

<u>*Supply*</u>

The preliminary estimate of 64,000 acre feet per year (afpy) has been developed as the sustainable yield of the Gulf Coast Aquifer within Montgomery County based on an assumed recharge rate of approximately 1.1 inches per year over the 697,600 acre area of the county. The LSGCD has adopted the 64,000 afpy estimate for the purposes of its Groundwater Management Plan (GMP), and is currently awaiting the results of a three year US Geological Survey (USGS) study of the recharge rate, to be completed in 2010. .The LSGCD DRP requires that groundwater supplies total no more than 70 percent of total water demands on January 1, 2015, and that the average groundwater use for the Joint WRAP planning period of 2015 through 2045 be no more than the current annual yield of the Gulf Coast Aquifer in the region of 64,000 acre-feet per year.

The SJRA conducted a "Potential Source Study" to identify potential alternative surface water sources that could be utilized in Montgomery County in order to reduce current groundwater use as well as meet increasing demands. The study concluded that the most cost-effective alternative was to utilize the full permitted yield of Lake Conroe by way of SJRA's existing water rights, as well as the City of Houston's water rights in Lake Conroe via a long term contract.

A key to the Joint WRAP approach is the benefit of removing the burden of compliance from smaller entities not equipped to meet the regulatory requirements on their own, and allows participants to develop the most cost-effective solution to meet regulatory goals by taking advantage on the economy of scale that can be realized by building larger treatment and transmission facilities at a lower cost per unit of capacity. The most cost-effective solution is based on over-converting large concentrations of groundwater use for the benefit of all Participants, especially small, remote, users to which it would be cost prohibitive to convey surface water.

Currently, the average groundwater pumpage in Montgomery County is 4.4 mgd, but this varies seasonally from 1.0 mgd in winter months to as high as 12.0 mgd in the summer months. In order to meet all of the annual demand with surface water, treatment and transmission facilities would need to be sized for 12 mgd, 2.7 times the average daily flow. It was determined that sizing a system this way would be cost prohibitive, and that treatment and transmission facilities should provide sufficient surface water in order to meet regulatory conversion requirements without the unnecessary over-sizing of infrastructure, a capacity equal to roughly 125% of average daily demands. It was estimated that by providing surface water at a maximum rate equal to the Participant's average daily demand, roughly 80% of the annual water demand would be met by surface water. The use of groundwater to meet peaking demands is allowed within the DRP guidelines, so long as average use over the planning period is less than 64,000 acre-feet per year.

In order to meet initial groundwater reduction requirements it was determined that the most economical option was to over-convert the more densely populated areas of Conroe and the Woodlands, the two largest groundwater producers in the county, by adding capacity to a treatment and transmission system until that supply of surface water lowered the total WRAP Participant's use of groundwater to 62,446 ac-ft in 2015. The Woodlands is converted to approximately 80% surface water by delivering surface water to all five existing water plants in The Woodlands. In addition, the majority of the City of Conroe's water demands west of Interstate Highway 45 are converted to surface water by delivering enough surface water to replace approximately 80% of the annual water production of the City's water plants west of IH 45. For conversions after 2015, projected 2045 water demands were considered in the determination of facilities to add to the ultimate conversion strategy. In this alternative, there will ultimately be three primary surface water transmission lines:

- To the east, serving the City of Conroe and other adjacent or nearby Participants to the north, south and east of Conroe.
- To the south, serving The Woodlands and other adjacent or nearby Participants to the north, east, south, and west of The Woodlands.
- To the west, serving Participants on the west side of Lake Conroe, including the City of Montgomery.

For the purposes of this Joint WRAP, the average surface water to be delivered at 10 year milestones is estimated to be 20,164 afpy in 2015, 60,492 afpy in 2025, 80,656 afpy in 2035, and 100,000 afpy in 2045. These capacities coincide with the assumed 80% conversion of annual volume described earlier.

Table 3
Groundwater Reduction Strategy

	Demand (Acre-Feet/Year)			
	2015	**2025**	**2035**	**2045**
Existing and Future Participant Demand	89,209	113,290	136,877	165,453
Power Generation Estimated Surface Water Demand	7,033	8,452	10,054	12,007
Average Treated Surface Water to be Delivered	20,164	60,492	80,656	100,000
Total Groundwater Use	62,012	44,346	46,167	53,446

Numerous potential users of reclaimed wastewater have been identified among the 197 Participants in the Joint WRAP. Possible users of reclaimed water that provide the greatest potential include golf courses, property owners associations, MUDs that currently use groundwater for amenity lake maintenance and/or irrigation, and other irrigated areas such as school athletic fields, and public and commercial landscaping. In addition, numerous potential users of untreated Lake Conroe raw surface water for irrigation purposes were identified.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Sugar Land GRP

DATE: July 6, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Sugar Land Coalition will reduce groundwater use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 10,080 AFY in 2013 and 24,640 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE:	30% reduction – 2013 60% reduction – 2025
TOTAL STRATEGY COST: (Costs rounded to nearest $100)	$59,550,000 capital cost, surface water plant, Phase 1 $23,275,000 capital cost, transmission line, Phase 1 $66,739,700 capital cost, surface water plant, Phase 2 $11,795,400 capital cost, transmission line, Phase 2
UNIT WATER COST:	$1,234 per acre-foot allocated in 2011 RWP

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a Groundwater Reduction Plan (GRP) which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The Sugar Land Coalition brings together the city and 17 other entities to implement their GRP. The entities included in the Sugar Land Coalition are listed in Table 1. The GRP also utilizes water reuse and efficient and water conservation management practices, including participation in the FBSD's WaterWise program.

Table 1
Participants in GRP

WUG Name	Listed as a WUG in Regional Water Plan
City of Sugar Land	Yes
Fort Bend County MUD No. 112 (New Territory)	No
Fort Bend County MUD No. 106 (Greatwood)	Yes
Fort Bend County MUD No. 1 (River Park)	No
Plantation MUD	Yes
Royal Valley Utilities, Inc.	No
Texas Department of Criminal Justice (TDCJ)	No
Avalon CAI	No
New Territory Residential Community Association	No
Sugar Lakes Homeowners Association	No
River Park HOA	No
Royal Lake Estates HOA	No
First Colony Community Service Association	No
Sugar Mill Community Association	No
WSG Sweetwater IV, LP (Sweetwater Golf)	No
River Point Golf Course	No
Texas Par Golf Academy, Inc.	No
Schlumberger Technology Corporation	No

Analysis:

The GRP lays out the City of Sugar Land's planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The City is partnering in this endeavor with 17 other entities, our combined systems representing 67 wells in total. These entities include extraterritorial jurisdiction (ETJ) communities and select private well owners in the City and ETJ.

This GRP is the culmination of many years of planning and several studies evaluating the City's potential conversion strategies. The final supply and demand projections, infrastructure sizing and cost estimates, and selection of comprehensive conversion strategies are the result of the City's Water Master Plan 2007 Update. The Water Master Plan Update, the bulk of which being the demand and supply projections, hydraulic modeling, water quality analysis and infrastructure planning for the GRP, was approved by the City Council on December 12, 2007.

The primary strategy used has been to over-convert densely populated areas, making use of existing potable water infrastructure. The primary source of their non-groundwater supplies will be the phased implementation of a City-owned surface water treatment plant. Treated surface water from this plant will be piped to existing water plants, mixed with groundwater based on seasonal usage patterns, and then pumped into our existing City water system, and eventually out to select areas of the ETJ at later conversion milestones. The Brazos River/Oyster Creek surface water the City will utilize in these efforts is currently under contract with the Gulf Coast Water Authority and Fort Bend County Water Control and Improvement District No. 1.

The preliminary plant design and sizing are both conservative estimates. The City has incorporated all available data regarding regional water quality issues into the considerations of our treatment design. The plant cost is currently based on a MF/UF Membrane treatment plant with the option for potential implementation of a Reverse Osmosis (RO) side stream. We feel this combination of treatment technologies and distribution strategies is sufficiently conservative to allow for unforeseen future changes in water quality or regulatory compliance.

To complement our surface water plant, the City is investing in the planning and implementation of nonpotable water projects using both raw surface water and treated wastewater effluent. Additionally, the

City is participating in the Subsidence District's WaterWise program and working on a series of water conservation efforts. To be conservative, our demand projections and preliminary plant sizing consider only those nonpotable projects and credit volumes that are either already being implemented or are designated projects. However, it is the City's intent to utilize its nonpotable supplies to the greatest extent feasible, and potential future projects are also identified in this report.

The timelines for the infrastructure projects necessary to implement these conversion strategies is included in this report. The City has created a surface water enterprise fund to pay for the costs of the conversion process, which will be funded by a mix of revenue bonds and system revenues.
The system revenues are supplied via a pumpage fee (currently $0.25/1000 gallons of water whether pumped groundwater or supplied alternative sources) that the City has already implemented for itself and its GRP participants.

Water User Group Application:

The Sugar Land Coalition has starting implementation of this strategy, specifically construction of the surface water treatment plant. This method has the potential to reduce shortages by 10,080 AFY in 2013 and 24,640 AFY in 2025. The preliminary plant sizing calculations are shown in Table 2.

Table 2
Preliminary Plant Sizing Calculations

Preliminary Plant Sizing Calculations - Phase I		
Year 2024 Average Daily Flow	31.81 MGD	
Add: Over Conversion for Private Well Owners ADF:	1.69 MGD	
Subtotal of All Users:	33.50	
Conversion to Surface Water Basic Requirement:	10.05 MGD	
Less Non-Potable Water Usage:	2.00 MGD	at 1:1 Ratio
Subtotal Adjusted Surface Water Requirement:	8.05 MGD	
Plant Oversizing Percentage:	10%	
Phase I Plant Size:	**8.85** MGD	
Recommend:	**9.00 MGD**	
Preliminary Plant Sizing Calculations - Phase II		
Ultimate Average Daily Flow	33.07 MGD	
Add: Over Conversion for Private Well Owners ADF:	1.69 MGD	
Subtotal of All Users:	34.76	
Conversion to Surface Water Basic Requirement:	20.86 MGD	
Less Non-Potable Water Usage:	2.00 MGD	at 1:1 Ratio
Subtotal Adjusted Surface Water Requirement:	18.86 MGD	
Oversizing Percentage:	15%	
Needed Plant Size, Total:	21.68 MGD	
Less Phase I Construction	9.00	
Phase II Plant Expansion:	**12.68** MGD	
Recommend:	**13.00 MGD**	

Issues and Considerations:

In Fort Bend County, the potential reduction in groundwater use may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the Sugar Land Coalition. Accomplishing the water conservation demand reductions requires pro-active implementation. One of the impacts associated with the strategy outlined herein or that may result from implementation of the water management strategy is the increase in permitted GCWA diversions. Otherwise the water management strategy should produce minimal environmental impacts.

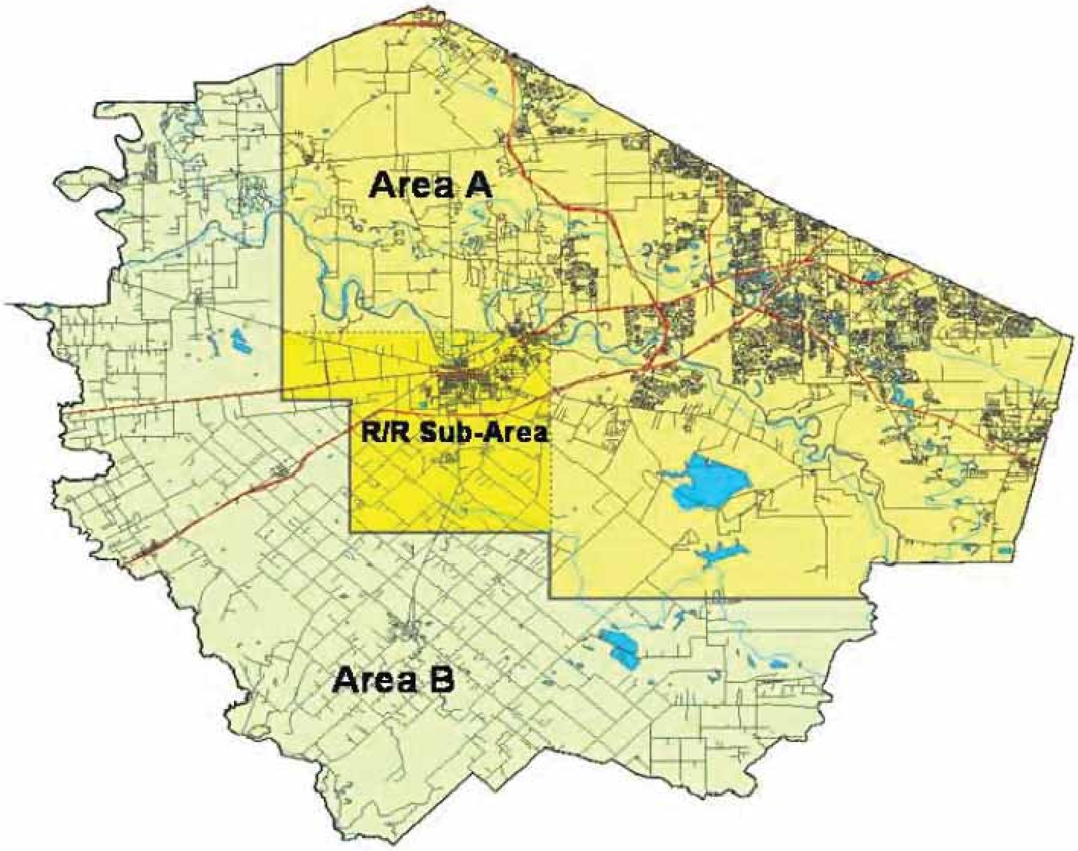
References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

City of Sugar Land Groundwater Reduction Plan, City of Sugar Land, March 2008

City of Sugar Land 2010-2014 Capital Improvement Program – Surface Water

Figure 1. Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Transmission Line to CHCRWA Municipal WUG and WWP

DATE: September 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The transmission of Lake Houston surface water supplies via the Northeast Water Purification Plant (NEWPP) to the Central Harris County Regional Water Authority (CHCRWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 4,800 acre-feet per year (CHCRWA Portion Only). Note that this is not a new supply but rather represents conveyance of a volume reflected under other WMS.

SUPPLY SOURCE: Surface water from Lake Houston and Lake Livingston via NEWPP.

IMPLEMENTATION DECADE: 2010 – Greens Road Transmission line, Phase I and Major Distribution Infrastructure

TOTAL STRATEGY COST: TBD

UNIT WATER COST: TBD

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Authority was created in 2005 to prepare and implement a plan to construct and operate the necessary public water transmission facilities to convert an area in central Harris County, Texas, comprised of eleven (11) conservation and reclamation districts from groundwater to surface water. The Authority will wholesale treated surface water to connected participants. Surface water will be purchased from the City of Houston (COH) and is conveyed to participants' water plant facilities.

Analysis:

To meet the 2010 to 2019 water demands, the COH will provide a transmission line from the NEWPP to the intersection of the Sam Houston Toll Road (Beltway 8) and US 59 (Eastex Freeway). The North Harris County Regional Water Authority (NHCRWA) will connect at this point and construct its own transmission line. The transmission line will be a 60-inch diameter pipe traveling through easements north to Greens Road. At Greens Road, the pipeline will be constructed in the right-of-way of Greens Road. The pipeline would then turn north to meet the Spears Road Regional Pump Station, where the water will discharge into groundwater storage tanks at a proposed pump station. The 2020 through 2030 proposed transmission system, from the NEWPP to the proposed pump stations, will convey only water for wholesale customers within the NHCRWA.

CHCRWA is also responsible for the construction of a transmission line to the take point from the NHCRWA transmission line and secondary surface water transmission system to its member districts. In order to secure treated capacity, the CHCRWA will participate in the Northeast Water Purification Plant (NEWPP) for a portion equal to their need for treated surface water.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in CHCRWA throughout the planning period. The Greens Road transmission line will be completed in a cost sharing program with North Harris County Regional Water Authority. The preliminary estimate of capital costs are shown in Table 1.

Issues and Considerations:

Although the supply infrastructure (Lake Houston via NEWPP) is in place, the conveyance required for this transfer is not. The NHCRWA transmission lines or similar transmission lines must be constructed to move this supply into the San Jacinto River Basin.

References:

North Harris County Regional Water Authority Groundwater Reduction Plan, Central Harris County Regional Water Authority, May 2003

"Texas Water Development Board Approves $22,050,000 Loan to the Central Harris County Regional Water Authority for Water Project Construction." TWDB Press Release, http://www.twdb.state.tx.us, March 25, 2008, accessed July 9, 2009.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: CLCND West Chambers System

DATE: November 24, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Development of additional infrastructure to treat and distribute surface water to western Chambers County

SUPPLY QUANTITY: TBD – up to approx. 2,800 afy allocated in DB12. Right holder has substantial remaining water in right.

SUPPLY SOURCE: Trinity River

IMPLEMENTATION DECADE: 2020 (2014)

TOTAL STRATEGY COST: $20,380,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $408 (for allocated portion of right)

<u>Water Management Strategy Analysis Description</u>

Introduction:

This WMS consists of allowing the Chambers-Liberty County Navigational District (CLCND) treatment and distribution system to provide run-of-river supply diverted from the Trinity River to users in western Chambers County.

Analysis:

The project would use existing canals to convey raw surface water from a new diversion point on the Trinity River (under the existing CLCND right) to a proposed surface water treatment plant. Water would be used by municipal WUGs in western Chambers County. This WMS would reduce groundwater use.

Water User Group Application:

Treated water will be delivered to municipal WUGs in western Chambers County.

Issues and Considerations:

A Certificate of Adjudication Amendment is required to add a diversion point for the CLCND water right.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Houston Treatment and Distribution Expansion

DATE: November 30, 2009

SUMMARY

STRATEGY DESCRIPTION: Expansion of City of Houston treatment and distribution capacity to meet Harris-Galveston Subsidence District Regulations as well as increasing customer demands.

SUPPLY QUANTITY: Enhanced treatment and distribution; new supply is from other strategies

SUPPLY SOURCE: Lake Houston, Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST:	$66,895,500 capital cost, 2010 treatment
(Costs rounded to nearest $100)	$975,979,500 capital cost, 2020 treatment
	$446,248,900 capital cost, 2030 treatment
	$223,261,800 capital cost, 2040 treatment
	$166,643,200 capital cost, 2050 treatment
	$166,643,200 capital cost, 2060 treatment
	$118,060,000 capital cost, 2011-2015 transmission expansion

UNIT WATER COST: $1,003 per ac-ft for treatment

Water Management Strategy Analysis Description

Introduction:

The City of Houston (COH) is among the largest providers of surface water to customers in Region H. COH currently treats water originating in Lakes Houston and Livingston at three treatment plants prior to distribution to customers. The three plants are the Northeast Water Purification Plant (NEWPP), the East Water Purification Plant (EWPP), and the Southeast Water Purification Plant (SEWPP). Over the course of RWP planning period, increasing COH and customer demands as well as Harris-Galveston Subsidence District requirements will drive the need for additional surface water treatment and distribution capacity.

Analysis:

Increasing need for treated surface water throughout the COH service area will require development of additional treatment and distribution capacity. The City currently operates three surface water treatment plants (NEWPP, SEWPP, and EWPP). Primary customers for the NEWPP are NHCRWA, CHCRWA, WHCRWA (after 2020), and NFBWA (after 2025). Source water for the NEWPP is from Lake Houston with Trinity River water delivered to Lake Houston through Luce Bayou beginning in 2020. The City will also need to treat water at the NEWPP for COH needs. The SEWPP serves Clear Brook City MUD, Pearland, Friendswood, and Webster as well as WUGs served by the City of Pasadena, Clear Lake City Water Authority, and the La Porte Area Water Authority. Water is supplied to the SEWPP via the

Southwest Lateral of the CWA canal system. Remaining demand for COH is assigned to the EWPP, including much of the demand for COH itself. The EWPP is also supplied by the CWA canal system.

In order to estimate the future treated capacity needs for the COH, existing contracts and future water management strategy allocations (with COH as the WWP) were assigned to the appropriate water treatment plant. Demands for each plant are assumed to peak at a multiplier of 1.4. Capacity requirements for each plan are shown in Tables 1 through 3. Note that for the EWPP, required capacity was estimated as the total demand on COH supplies from Lakes Houston and Livingston less raw water needs for industry and the capacity already handled at the other two plants. Due to limitations on available information, capacity estimates have not been made for pump stations or internal distribution.

Table 1
NEWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
NHCRWA	999904	34,714	91,167	117,755	99,625	81,126	117,755
CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806
WHCRWA	999907	0	30,596	45,083	51,518	54,307	57,161
NFBWA	999901	0	0	17,527	30,717	40,728	49,998
COH[1]	396200	0	44,830	44,830	68,000	68,000	68,000
TOTAL		37,089	170,739	229,984	254,666	248,967	297,720
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***55,634***	***233,694***	***322,561***	***347,999***	***339,451***	***412,580***

[1]Assuming 40 MGD for COH from Luce Bayou through 2030 and 60.7 MGD after 2030.

Table 2
SEWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
Clear Brook City	084063000	1,680	1,680	1,680	1,680	1,680	1,680
City of Pasadena	651900	40,379	40,792	41,179	41,667	42,093	42,582
Clear Lake City Water Authority	159000	17,866	17,866	17,866	17,866	17,866	17,866
Pearland	080457000	16,235	16,235	16,975	18,597	20,720	23,148
Friendswood	080219000	6,719	6,719	6,719	6,719	6,719	6,719
Webster	080635000	9,010	9,010	9,010	9,010	9,010	9,010
La Porte	080346000	8,190	8,186	8,190	8,177	8,175	8,173
South Houston	080569000	4,199	4,199	4,199	4,199	4,199	4,199
TOTAL		104,278	104,687	105,818	107,915	110,462	113,377
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***145,989***	***146,562***	***148,145***	***151,081***	***154,647***	***158,728***

Table 3
EWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
COH L Houston		140,957	176,100	176,056	178,600	175,772	172,928
COH L Livingston		764,699	896,602	1,002,238	1,029,324	1,064,324	1,064,324
Manufacturing[1]	081001101	-384,899	-389,274	-393,021	-391,622	-390,987	-322,393
Mining[1]	081003101	-143	-279	-365	-464	-556	-641
Steam Electric [1]	081002101	-14,769	-21,565	-25,213	-25,454	-26,194	-29,756
NEWPP Total		-37,089	-170,739	-229,984	-254,666	-248,967	-297,720
SEWPP Total		-104,278	-104,687	-105,818	-107,915	-110,462	-113,377
TOTAL		364,478	386,158	423,893	427,803	462,930	473,365
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***510,269***	***540,621***	***593,450***	***598,924***	***648,102***	***662,711***

[1]Raw water demands met by the City of Houston.

Table 4 shows current (2009) plant capacities for each plant along with COH projections of future plant capacity by decade. These capacities are compared to the required capacities above to determine if expansion in excess of that already anticipated by COH will be required (see Table 5).

Table 4
Planned Treatment Plant Capacity by Decade

Plant	Unit	Current	2010	2020	2030	2040	2050	2060
NEWPP	MGD	80	80	280	440	520	580	640
	ac-ft	89,600	89,600	313,600	492,800	582,400	649,600	716,800
SEWPP	MGD	120	120	200	200	200	200	200
	ac-ft	134,400	134,400	224,000	224,000	224,000	224,000	224,000
EWPP	MGD	260	280	350	350	350	350	350
	ac-ft	291,200	313,600	392,000	392,000	392,000	392,000	392,000

Table 5. Projected Capacity and Additional Plant Capacity Requirements (ac-ft)

Plant	Capacity	2010	2020	2030	2040	2050	2060
NEWPP	Peaked Demand	55,634	233,694	322,561	347,999	339,451	412,580
	Projected Capacity	89,600	313,600	492,800	582,400	649,600	716,800
	Addl Capacity Reqd.	***-33,967***	***-79,907***	***-170,239***	***-234,401***	***-310,150***	***-304,220***
SEWPP	Peaked Demand	145,989	146,562	148,145	151,081	154,647	158,728
	Projected Capacity	134,400	224,000	224,000	224,000	224,000	224,000
	Addl Capacity Reqd.	***11,589***	***-77,438***	***-75,855***	***-72,919***	***-69,353***	***-65,272***
EWPP	Peaked Demand	510,269	540,621	593,450	598,924	648,102	662,711
	Projected Capacity	313,600	392,000	392,000	392,000	392,000	392,000
	Addl Capacity Reqd.	***196,669***	***148,621***	***201,450***	***206,924***	***256,102***	***270,711***
TOTAL Additional COH Capacity Needed		**174,292**	**-8,724**	**-44,644**	**-100,396**	**-123,401**	**-98,781**

It is the City's official position that they will be able to take from the NEWPP all they need to meet growing demands; that is, they are operating as a unified system and can shift demands from one plant to another. Past a certain point, this will involve additional pipeline capacity to move water from one location to another. Thus, the extra capacity projected for the NEWPP and SEWPP (negative values in Table 5) will be able to meet the excess demand indicated for the EWPP.

The exception to this is the period for 2010 through 2019, for which total demands are shown to exceed total system treatment capacity. However, note that the required capacities estimated from Region H data reflect contract amounts and WMS allocations rather than actual demands. While the Authorities (NHCRWA, NFBWA, WHCRWA, CHCRWA) are beginning to take surface water beyond their demands to expedite surface water conversions, not all COH customer WUGs will be using their full contracted volume beginning in 2010. Thus, the required treatment capacity in early decades is overly conservative, but becomes more accurate with time as WUG demands meet or exceed current contract amounts. For this reason, it is expected that the treatment capacities listed in Table 4 will be adequate to meet needs through 2060.

Costs were estimated for plant expansions using the Region H cost estimation criteria (Appendix 4C). Treatment plant expansion cost was estimated as $2,000,000 per MGD of added capacity. Engineering and contingency costs were assumed to be 35 percent of the capital cost for construction. Interest during construction is calculated, according to TWDB guidelines, as the total interest accrued by a 6 percent annual interest rate on the total borrowed funds at the end of the construction phase less a 4 percent annual rate of return on investment of unspent funds. A standard construction period of 2 years is used to calculate interest. Annual costs calculated consisted of debt service and operations and maintenance costs (assumed at 2.5 percent of construction cost).

Table 6
Estimated Cost of COH Surface Water Treatment Capacity Expansion

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$1,350,907,294	$ 1,350,907,294
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 472,817,553	$ 472,817,553
3	LAND & EASEMENTS	1	LS	$ -	$ -
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ -	$ -
5	INTEREST DURING CONSTRUCTION	1	LS	$ 221,947,314	$ 221,947,314
	PROJECT COST				**$ 2,045,672,161**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ 5,832,257	$90,922,599	$123,996,351	$ 58,370,987	$ 33,993,695	$ 29,057,434
2	OPERATION & MAINTENANCE (O&M)	$ 1,104,401	$ 17,217,171	$ 24,584,442	$ 28,270,345	$ 31,021,514	$ 33,772,682
3	PUMPING ENERGY COSTS	$ 733,376	$ 13,567,456	$ 19,434,464	$ 22,367,968	$ 24,568,096	$ 26,768,224
	TOTAL ANNUAL COST	**$ 7,670,034**	**$ 121,707,226**	**$ 168,015,257**	**$ 109,009,300**	**$ 89,583,305**	**$ 89,598,340**

Near-term costs for City of Houston transmission and distribution expansions were provided in the COH's proposed Adjusted Water Capital Improvements Program for Surface Water Transmission (CIP). The CIP included proposed capital spending levels for the period from 2011 through 2022. Based on the data from the CIP, costs for the RWP are estimated as $229,390,000 for 2020 and $31,650,000.

Water User Group Application:

The planned expansions of the NEWPP, SEWPP, and EWPP will enable the COH to meet increasing needs for itself and customer WUGs and WWPs as well as enabling the COH and customers to meet groundwater reduction mandates established by the Fort Bend Subsidence District and the Harris-Galveston Subsidence District.

Issues and Considerations:

The ability of the COH to meet growing demands for surface water is contingent on timely completion of the Luce Bayou interbasin transfer.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Harris County MUD No. 50 Water Treatment Plant

DATE: November 24, 2009

SUMMARY

STRATEGY DESCRIPTION: A surface water treatment plant for Harris County MUD No. 50

SUPPLY QUANTITY: 632 acre-feet per year. Since this volume is from an existing contract, it is listed in the water planning database as an existing supply.

SUPPLY SOURCE: San Jacinto Basin (via canal)

IMPLEMENTATION DECADE: 2020 (2013)

TOTAL STRATEGY COST: $6,131,600 capital cost, treatment plant construction (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $736 per ac-ft

Water Management Strategy Analysis Description

Introduction:

The Harris-Galveston Subsidence District regulatory plan mandates that encompassed municipalities and utility districts limit groundwater use to 20 percent of their total demand through 2030. In order to meet this requirement, Harris County Municipal Utility District No. 50 (MUD No. 50) pursuing the development of a surface water treatment plant.

Analysis:

MUD No. 50 proposes having a 1 MGD surface water treatment plant active by July 2013. The San Jacinto River Authority has provided MUD No. 50 with a letter of availability to provide surface water. Raw water would be received via a canal near the proposed plant site. The City of Houston has provided the MUD with a quality analysis of the raw water source.

Water User Group Application:

Raw water will be treated and used to meet demands for the Harris County MUD No. 50 WUG.

Issues and Considerations:

None.

References:

Harris County MUD No. 50 Surface Water Treatment Plant Preliminary Engineering Report, June 2007.

Harris-Galveston Coastal Subsidence District – District Regulatory Plan, Harris-Galveston Subsidence District, September 2001.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Luce Bayou Interbasin Transfer

DATE: November 18, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of a raw water pumping station, pipelines, canal, and rectification of the Luce Bayou channel to convey a portion of the City of Houston's Trinity River water supply to Lake Houston to supply demands in northern and western Harris County and northern Fort Bend County.

SUPPLY QUANTITY: Up to 329,000 acre-feet per year through 2040[1]
Up to 450,000 acre-feet per year (current permit) ultimate capacity

SUPPLY SOURCE: Trinity River

IMPLEMENTATION DECADE: 2020 (pump station phasing for 2040 and ultimate development)

TOTAL STRATEGY COST: $253,917,000 capital cost (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $90 per acre-foot in 2040

<u>Water Management Strategy Analysis Description</u>

Introduction

The City of Houston (City) is a major water provider in Region H and will provide treated surface water to numerous municipalities, districts and areas outside of its current corporate limits. Many of these WUGs, as well as a significant amount of the City's own growth in surface water demand, are located in northern and northwestern Harris County. The Northeast Water Purification Plant (NEWPP) on the western edge of Lake Houston provides is slated to serve the entirety of the surface water that is planned to be required by the North Harris County Regional Water Authority (NHCRWA) and the Central Harris County Regional Water Authority (CHCRWA). In addition, the NEWPP has been identified as the source for future phases of conversion for the West Harris County Regional Water Authority (WHCRWA) and North Fort Bend Water Authority (NFBWA) beginning in 2020 and 2025, respectively.

The NEWPP takes its raw water directly from Lake Houston. The City's East Water Purification Plant (EWPP) and a group of industries also draw raw water supplies from Lake Houston. By year 2020, demands for this customer base will exceed the City's firm raw water supplies currently available in Lake Houston.

However, supplies owned by the City in the Trinity River basin in conjunction with other available supplies from the Trinity River Authority are sufficient to meet the demands of this customer base. The City's permit for Lake Livingston allows for the inter-basin transfer of supply via Luce Bayou. However, this conveyance system has not yet been constructed. The Luce Bayou strategy will supply Trinity River water to the upstream end of Luce Bayou. From there, the water will flow to and be available from Lake Houston.

---

[1] *Luce Bayou Interbasin Transfer Project DRAFT Preliminary Engineering Report*, October 2009

This project is currently in the preliminary engineering phase of development, funded by the Water Development Board Water Infrastructure Funding. The description of the project contained within this memorandum is subject to revision as details of the design are worked out prior to completion by 2020.

Analysis

The recommended concept for the Luce Bayou project consists of a raw water pump station at Capers Ridge on the Trinity River, three miles of pipeline leading to a sedimentation basin, followed by approximately 23.6 miles of canal that will lead to an outfall in Lake Houston. The conveyance facilities for the project will be built to ultimate capacity in the first phase of the project, while pump station facilities at Capers Ridge will be phased, with the first phase of development provided to meet year 2040 demands. These needs are shown in *Table 1*, below.

Table 1
Luce Bayou ADF Demands for Year 2040

NHCRWA	117,755
CHCRWA	4,806
WHCRWA [1]	39,000
NFBWA [1]	30,717
COH (NEWPP) [2]	44,800
COH (EWPP) [3]	22,400
Industrial Customers	89,499
TOTAL DEMANDS	**348,977**
Lake Houston Supply [4]	173,300
REMAINING ADF NEEDS	**175,677**

1 Portion of demand not met by EWPP supply.
2 Portion of NEWPP capacity required by COH (40 MGD).
3 20 MGD of supplied to EWPP through West Canal.
4 Includes COH portion of Lake Houston additional yield.

Peaking in the system will affect the needs for the maximum capacity of the conveyance. Current studies underway have identified a peak rate of 329,000 Ac-Ft/Yr for meeting demands in 2040. This factor accounts for the potential loss of up to 15% of the conveyed capacity through evaporation and channel losses. Final needs over time will vary based on the needs of participants and these projections are being further studied in the preliminary engineering phases of the project.

Water User Group Application

The water supplied by the Luce Bayou strategy will be mixed with the waters of Lake Houston, treated at the NEWPP and supplied to the City of Houston, NHCRWA, WHCRWA, CHCRWA, NFBWA and numerous other WUGs served by the COH.

Environmental Impact

Construction of Luce Bayou will require the development of pipeline and canal structures through a stretch of mixed land cover ranging from undeveloped forest near the Trinity River, to agricultural fields, to more developed areas near Lake Houston. Although this plan represents a disturbance along the alignment, this solution was identified as a preferable alternative to the improvement to the actual Luce Bayou channel in order to convey the volume of water needed. Luce Bayou is identified as a stream segment with high ecological function and the current alternative represents a favorable alternative to disturbance of this channel. The construction of an engineered channel also provides the greatest flexibility in minimizing environmental impacts by routing the conveyance around sensitive areas.

Impacts from the Luce Bayou strategy has been modeled in both the 2009 *Environmental Flows Study* conducted by Region H and the decadal analysis presented in *Appendix 4D* of this Plan. The project, along with other Region H strategies and the impacts of upstream influences were shown to have minor impacts on overall frequency of target attainment for Galveston Bay. Additional information can be found in the above-referenced studies.

It is not anticipated that the mixing of Trinity and San Jacinto River water within Lake Houston will result in a significant impact to water quality to the lake. However, the import of water has the potential to introduce foreign species to the basin.

Further environmental studies are currently being conducted as the preliminary engineering for the study continues.

Issues and Considerations

The City of Houston is expanding its Trinity River Pump Station below Livingston to realize the full permitted diversion rate. The addition of the Luce Bayou Diversion would give the City excess capacity, which could be used in conjunction with the Trinity River Pump Station to meet additional future needs and lend flexibility to Houston’s raw water conveyance capacity.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: NFBWA GRP/Transmission/Distribution

DATE: September 3, 2009

SUMMARY

STRATEGY DESCRIPTION: The transmission of 65,000 acre-feet per year of Lake Houston surface water supplies via the East Water Purification Plant (EWPP) and Northeast Water Purification Plant (NEWPP) to the North Fort Bend Water Authority (NFBWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 71,900 acre-feet per year transmission (NFBWA portion only), and approximately 106,400 acre-feet per year internal distribution. Note that this is not a new supply but rather represents conveyance / distribution of a volume reflected under existing and future contract water from the City of Houston.

SUPPLY SOURCE: Surface water from Lake Houston via East Water Purification Plant (EWPP) and Northeast Water Purification Plant (NEWPP).

IMPLEMENTATION DECADE: 2013 – Phase I Transmission line from EWPP
2025 – Phase II Transmission line from NEWPP

TOTAL STRATEGY COST: $225,000,000 capital cost, treatment and distribution
(Costs rounded to nearest $100) $213,000,000 capital cost, transmission line (NFBWA share)

UNIT WATER COST: $150 per acre-foot for transmission
$85 per acre-foot for distribution

Water Management Strategy Analysis Description

Introduction:

The North Fort Bend Water Authority (NFBWA) is a regional water authority created by the 79th Texas Legislature, with the passage of Senate Bill 1798 in May 2005. The primary reason for NFBWA's creation was to facilitate compliance with the Fort Bend Subsidence District's groundwater reduction mandates by creating a viable single entity to acquire, develop and deliver a long term supply of potable surface water to the water users in the NFBWA's Groundwater Reduction Plan (GRP). The water supply must come from an alternative supply, typically surface water.

Analysis:

The NFBWA has identified the City of Houston (COH) as the preferred source of water for long-term surface water supply. Water from the COH is projected to be available in sufficient quantities to meet the regulatory requirements of NFBWA throughout the planning horizon. The infrastructure to deliver this water will be built in two phases to facilitate conversion.

For the 2013 conversion, water will be supplied from the vicinity of the intersection of Bellaire Boulevard and South Dairy Ashford Street. Water received at the above location is treated at the COH East Water Purification Plant (EWPP) and conveyed through the COH transmission system.

For the 2025 conversion, the amount of water required by the NFBWA exceeds the capacity of the COH's existing system. The second take point will be from a proposed shared water supply line across the COH that will be built and operated jointly with the West Harris County Regional Water Authority (WHCRWA). The take point will be near the intersection of Clay and Peek Roads.

NFBWA is also responsible for the construction of a transmission line to the take point from the North Harris County Regional Water Authority (NCHRWA) transmission line and secondary surface water transmission system to its member districts.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in NFBWA throughout the planning period. NFBWA plans to participate in the WHCRWA pipeline to bring water from the COH across town to the north of NFBWA. This pipeline will provide the water for NFBWA's second take point in 2025. The preliminary estimate of capital costs are shown in Table 1.

Issues and Considerations:

Although the supply infrastructure (Lake Houston via NEWPP) is in place, the conveyance required for this transfer is not. The WHCRWA transmission lines or similar transmission lines must be constructed to move this supply into the San Jacinto River Basin.

References:

North Fort Bend Water Authority Groundwater Reduction Plan, North Fort Bend Water Authority, March 2008

North Fort Bend Water Authority Website, http://www.nfbwa.com/, assessed July 10, 2009.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Transmission Line to NHCRWA Municipal WUG and WWP

DATE: September 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The transmission of 164,900 acre-feet per year of Lake Houston surface water supplies via the Northeast Water Purification Plant (NEWPP) to the North Harris County Regional Water Authority (NHCRWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 117,800 acre-feet per year (does not includes CHCRWA shared capacity). Note that this is not a new supply but rather represents conveyance of a volume reflected under other WMS.

SUPPLY SOURCE: Surface water from Lake Houston via Northeast Water Purification Plant (NEWPP).

IMPLEMENTATION DECADE: 2010 – Greens Road Transmission line, Phase I and Major Distribution Infrastructure
2020 – Transmission line from NEWPP, Phase II and Major Distribution Infrastructure
2030 – Major Distribution Infrastructure

TOTAL STRATEGY COST: $153,149,600 capital cost, surface water plant, Phase I
(Costs rounded to nearest $100) $345,292,000 capital cost, surface water plant, Phase II
$80,690,000 transmission line, Phase I
$172,558,500 transmission line, Phase II
$37,439,500 infrastructure improvements

ANNUAL UNIT WATER COST: $106 per ac-ft transmission, $222 per ac-ft distribution

<u>Water Management Strategy Analysis Description</u>

Introduction:

On June 18, 1999, the bill that created the North Harris County Regional Water Authority (HB 2965) was signed into law. NHCRWA’s primary assignment is to develop and implement a strategy for complying with the Harris-Galveston Subsidence District's Regulatory Plan that requires a reduction in groundwater usage to no more than 20 percent of total water demand by the year 2030. Its boundaries are essentially US 290 on the west, the Harris County line on the north (Spring Creek), FM 1960 and Bammel-North Houston on the south and the western shores of Lake Houston on the east. The NHCRWA is comprised of approximately 335 square miles and includes approximately 600,000 residents. NHCRWA has 160 political subdivisions within its boundaries that include municipal utility districts, public utility districts, water control and improvement districts, fresh water supply districts, water supply corporations, and municipalities.

Analysis:

To meet the 2010 to 2019 water demands, the City of Houston (COH) has provided a transmission line from the NEWPP to the intersection of the Sam Houston Toll Road (Beltway 8) and US 59 (Eastex Freeway). The NHCRWA connected at this point and has constructed, in conjunction with the COH, a transmission main line. The transmission line will be a 60-inch diameter pipe traveling through easements north to Greens Road. At Greens Road, the pipeline will be constructed in the right-of-way of Greens Road. The pipeline would then turn north to meet the Spears Road Regional Pump Station, where the water will discharge into groundwater storage tanks at a proposed pump station.

The 2020 through 2030 proposed transmission system, from the NEWPP to the proposed pump stations, will convey only water for wholesale customers within the NHCRWA, as did the 2010 system. A 102-inch diameter line is planned from a shared transmission line with the COH around US59 to Hardy Road. At this intersection, the NHCRWA proposes a portion of the water would be diverted north along the right-of-way of Hardy Road through a 54-inch diameter pipe to discharge into ground storage tanks at the proposed pump station near the intersection of Hardy Road and Candleridge Street. The remaining water will be diverted through an 84-inch diameter pipeline extending west from Hardy Road along the right-of-way of Beltway 8. This pipeline ultimately terminates near SH249. This line would discharge into the ground storage tanks at the proposed pump station near this latter intersection.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in NHCRWA throughout the planning period. The Greens Road transmission line was completed in a cost sharing program with Central Harris County Regional Water Authority.

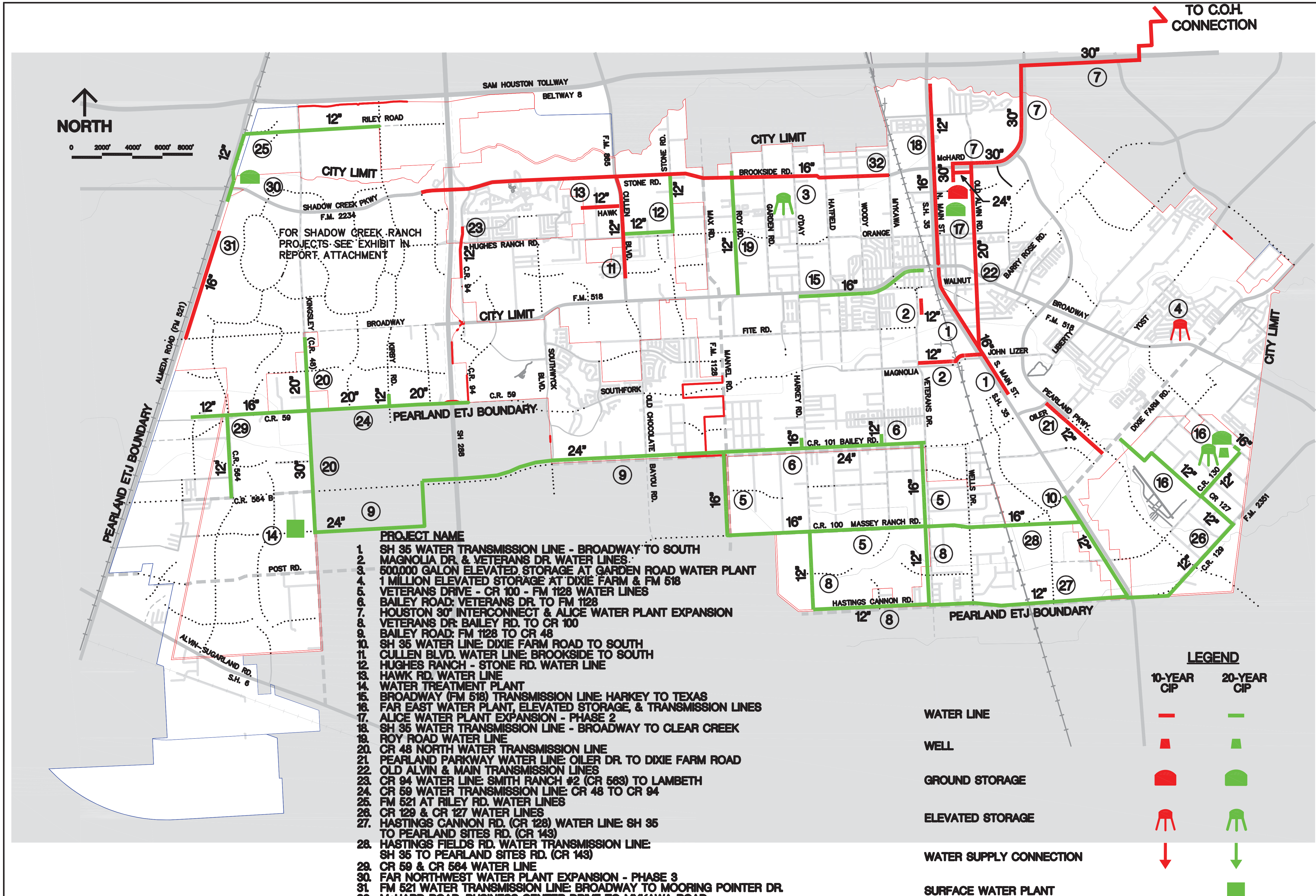
Issues and Considerations:

Providing adequate supply into the future will require the introduction of additional raw water supply to Lake Houston. The Luce Bayou project will be required beginning in 2020 to serve all of the customers of the NEWPP, including NHCRWA.

References:

North Harris County Regional Water Authority Groundwater Reduction Plan, North Harris County Regional Water Authority, May 2003

North Harris County Regional Water Authority Website, http://www.nhcrwa.com/, assessed July 9, 2009.



FREESE and NICHOLS
ENGINEERS · ENVIRONMENTAL SCIENTISTS · ARCHITECTS
11200 BROADWAY STREET, SUITE 2332
PEARLAND, TEXAS 77584-9786
832-456-4700 FAX 832-456-4701

CITY OF PEARLAND

WATER CAPITAL IMPROVEMENTS

DATE:
JUNE 2010

EXHIBIT NO.
1

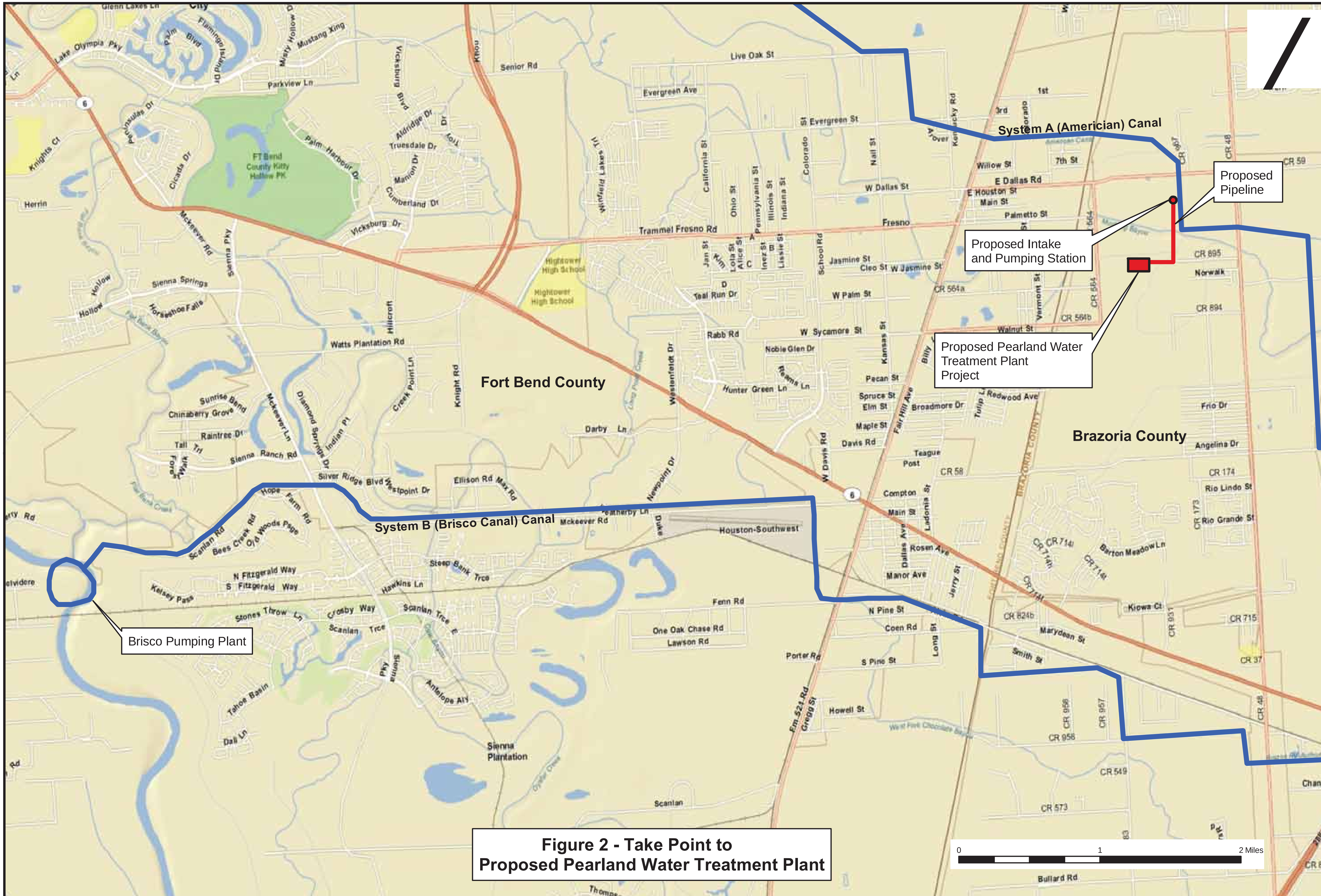


Figure 2 - Take Point to Proposed Pearland Water Treatment Plant

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Pearland Surface Water Treatment Plant and Conveyance System

DATE: December 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Development of a raw water conveyance system and surface water treatment plant for the City of Pearland to meet projected shortages and reduce dependence on groundwater.

SUPPLY QUANTITY: 6,720 ac-ft per year (10 mgd) in 2010
13,420 ac-ft per year (20 mgd) in 2040 (ultimate capacity)

SUPPLY SOURCE: Gulf Coast Water Authority (GCWA) Brazos River Supplies through a take point off GCWA's American Canal

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: Annual Operation Cost TBD
$ 46,500,000 - 2010 phase
$ 218,500,000 – 2020 phase

TBD

<u>Water Management Strategy Analysis Description</u>

Introduction:

The City of Pearland, Texas is located just south of Houston along the Gulf Coast and encompasses an area of approximately 48 square miles. Most of Pearland lies in northern Brazoria County with portions extending into Harris and Fort Bend Counties. Population estimates increased five-fold from 18,700 in 1990 to 92,600 in 2009 and is projected to double by 2026.

To plan for future growth and reduce dependence on groundwater, Pearland has contracted with the City of Houston for treated surface water from the Southeast Water Purification Plant and with Gulf Coast Water Authority for raw surface water supplies.

Analysis:

Pearland's current water facilities include groundwater wells, storage tanks, booster pumps, pipelines, and imported water connections. Pearland has in their 10 and 20 year Capital Improvement Plans to add facilities in order to serve future growth particularly the west side where there is more open land for future development. The demand/balance and resulting shortages is shown in Table 1.

Table 1
Supply/Demand Balance for Pearland in Brazoria and Harris Counties

		Brazoria						Harris					
		2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
	Demand	11,965	14,925	17,508	19,949	22,681	25,525	445	513	579	646	717	788
Existing Supply	Existing GCWA Supplies[1]	15,112	15,155	15,174	15,184	15,195	15,205	563	520	501	491	480	470
	Existing COH Supplies[2]	540	541	542	542	543	543	20	19	18	18	17	17
	Existing Groundwater[3]	0	0	0	0	0	0	89	103	116	116	116	116
Minor WMS	Conservation	216	538	631	719	817	920	8	18	21	23	26	28
	Expanded Use of Groundwater	0	0	421	1,142	1,692	2,074	0	14	27	27	27	27
	Expand / Increase Current Contracts[4]	0	0	201	294	325	0	0	0	0	0	4	0
	Remaining Shortage/Surplus[5]	*-3,903*	*-1,309*	*539*	*2,068*	*4,109*	*6,783*	*-235*	*-161*	*-104*	*-29*	*47*	*130*

Notes:

1. Brazos run-of-river supplies from water rights 5168 and 5322.
2. From the Livingston-Wallisville System.
3. Source is the Gulf Coast Aquifer.
4. Additional allocation out of Livingston-Wallisville supply.
5. Negative numbers indicate a surplus. This value represents the remaining amount that must be supplied through major WMS to meet shortages after minor WMS.

There is no supply shortage anticipated until 2030. However, the City of Pearland is planning on reducing their dependence on groundwater, utilizing surface water supplies currently contracted, and to begin conversion to surface water supply to meet a portion of their total demands. To facilitate this plan, Pearland does require additional facilities to convey and treat the raw water and distribute to the users. Pearland is responsible for the intake, pump station and transmission system from the take point from GCWA's American Canal to their surface water treatment plant site. The associated transmission and distribution systems are shown in Figure 1. A diagram of a possible conveyance route is shown in Figure 2. The projected cost of the conveyance system, water treatment plant , and the associated transmission and distribution systems is estimated to be a total of approximately $265,000,000 as provided in Table 2.

Table 2
Project Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10 MGD WATER TREATMENT PLANT, RESERVOIR, INTAKE PUMP STATION AND TRANSMISSION	1	EA	$ 122,131,350	$ 122,131,350
2	RAW WATER RESERVOIR, INTAKE AND PUMP STATION	1	EA	$ 34,342,100	$ 34,342,100
3	ASSOCIATED TRANSMISSION AND DISTRIBUTION SYSTEM	1	EA	$ 108,493,500	$ 108,493,500
	TOTAL PROJECT COST				$ 264,966,950

Water User Group Application:

With the goal of reducing the consumption of groundwater, the City of Pearland has started implementation of this strategy, specifically through the contractual agreements for water supply with the GCWA, acquisition of the surface water treatment plant site and stabilization of the future raw water reservoir. Water conveyed through this strategy would meet all projected shortages in the City of Pearland and area within its extraterritorial jurisdictional (ETJ) throughout the planning period.

Issues and Considerations:

One impact associated with the implementation of this water management strategy is the increase in GCWA diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the GCWA pump stations. However, these diversions will be made from existing water rights currently owned by the GCWA, contracted by the City of Pearland, and no new water rights permits are required for this strategy. Otherwise implementation of this strategy should produce minimal environmental impacts.

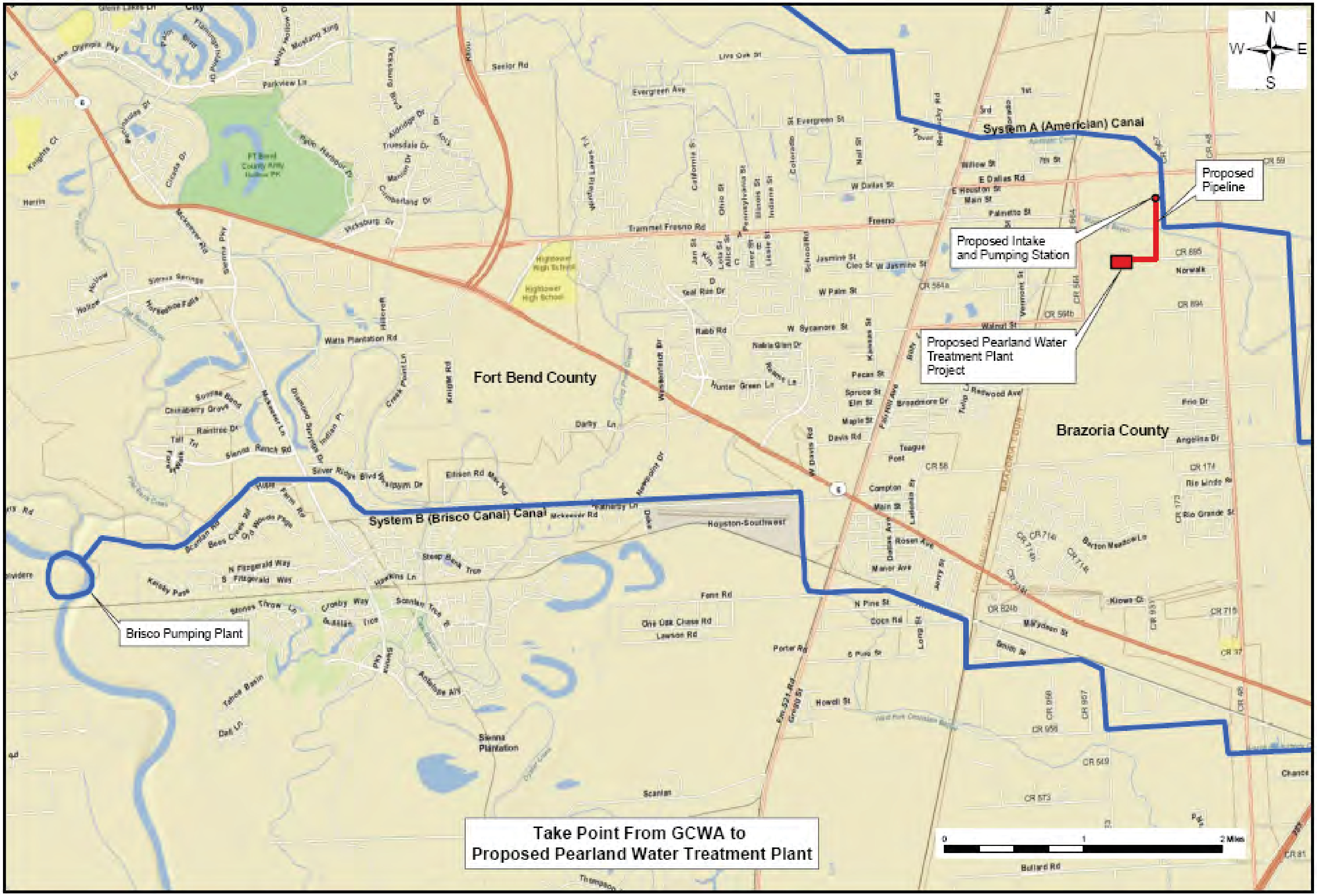
References:

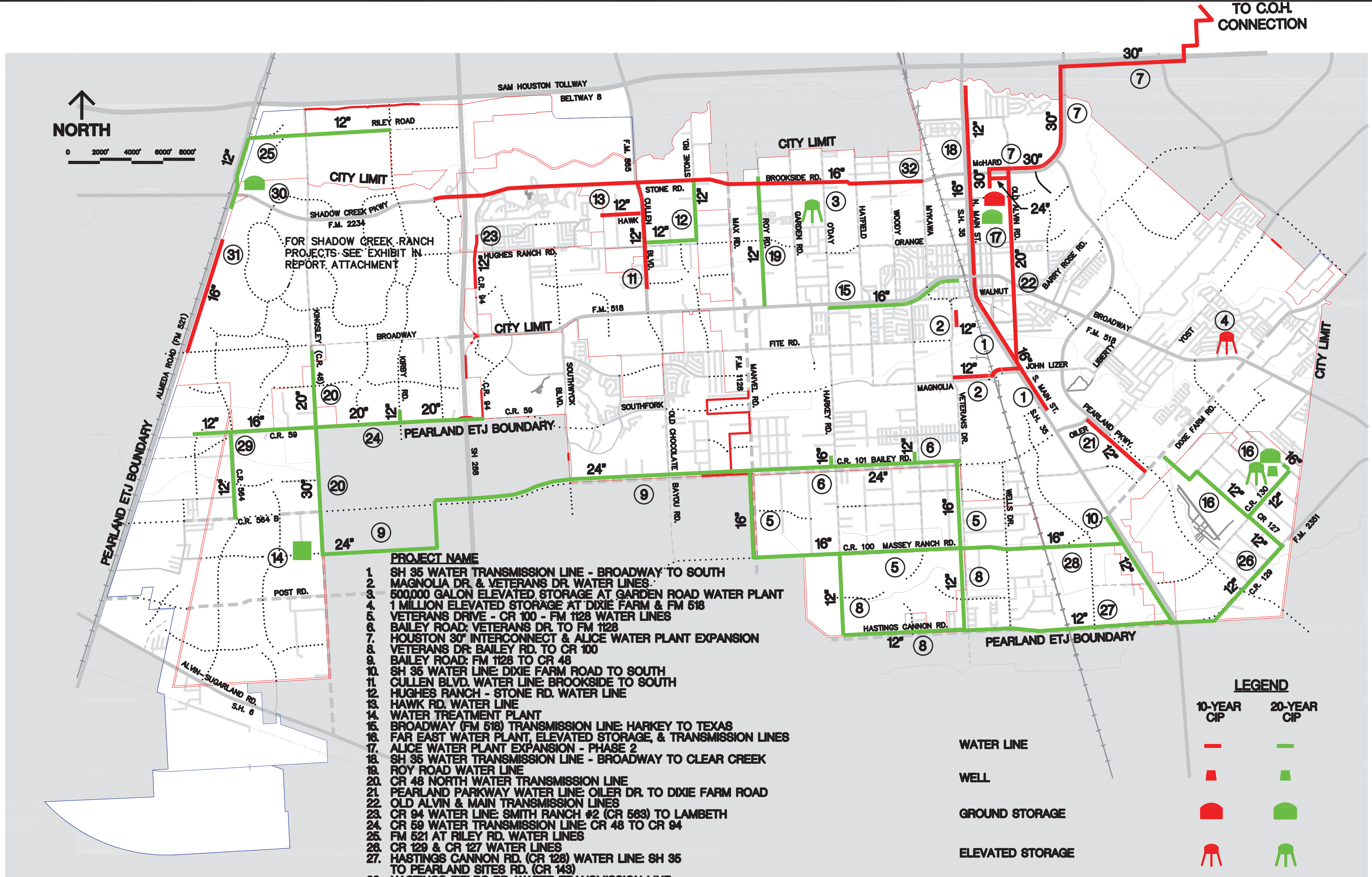
City of Pearland Water Model Update, MWH Americas, Inc., April 2007

City of Pearland Water and Wastewater Impact Fee Study 2007 Update, Freese and Nichols, Inc., May 2008

City of Pearland, Final Preliminary Engineering Report for the Construction of the New Surface Water Treatment Plant Raw Water Reservoir, Camp Dresser & McKee, Inc., May 2009

Figure 1: Potential Conveyance Route





PROJECT NAME

1. SH 35 WATER TRANSMISSION LINE - BROADWAY TO SOUTH
2. MAGNOLIA DR. & VETERANS DR. WATER LINES
3. 500,000 GALON ELEVATED STORAGE AT GARDEN ROAD WATER PLANT
4. 1 MILLION ELEVATED STORAGE AT DIXIE FARM & FM 518
5. VETERANS DRIVE - CR 100 - FM 1128 WATER LINES
6. BAILEY ROAD: VETERANS DR. TO FM 1128
7. HOUSTON 30" INTERCONNECT & ALICE WATER PLANT EXPANSION
8. VETERANS DR: BAILEY RD. TO CR 100
9. BAILEY ROAD: FM 1128 TO CR 48
10. SH 35 WATER LINE: DIXIE FARM ROAD TO SOUTH
11. CULLEN BLVD. WATER LINE: BROOKSIDE TO SOUTH
12. HUGHES RANCH - STONE RD. WATER LINE
13. HAWK RD. WATER LINE
14. WATER TREATMENT PLANT
15. BROADWAY (FM 518) TRANSMISSION LINE: HARKEY TO TEXAS
16. FAR EAST WATER PLANT, ELEVATED STORAGE, & TRANSMISSION LINES
17. ALICE WATER PLANT EXPANSION - PHASE 2
18. SH 35 WATER TRANSMISSION LINE - BROADWAY TO CLEAR CREEK
19. ROY ROAD WATER LINE
20. CR 48 NORTH WATER TRANSMISSION LINE
21. PEARLAND PARKWAY WATER LINE: OILER DR. TO DIXIE FARM ROAD
22. OLD ALVIN & MAIN TRANSMISSION LINES
23. CR 94 WATER LINE: SMITH RANCH #2 (CR 563) TO LAMBETH
24. CR 59 WATER TRANSMISSION LINE: CR 48 TO CR 94
25. FM 521 AT RILEY RD. WATER LINES
26. CR 129 & CR 127 WATER LINES
27. HASTINGS CANNON RD. (CR 128) WATER LINE: SH 35 TO PEARLAND SITES RD. (CR 143)
28. HASTINGS FIELDS RD. WATER TRANSMISSION LINE: SH 35 TO PEARLAND SITES RD. (CR 143)
29. CR 59 & CR 564 WATER LINE
30. FAR NORTHWEST WATER PLANT EXPANSION - PHASE 3
31. FM 521 WATER TRANSMISSION LINE: BROADWAY TO MOORING POINTER DR.
32. McHARD ROAD: BUSINESS CENTER DRIVE TO MYKAWA ROAD

LEGEND

	10-YEAR CIP	20-YEAR CIP
WATER LINE		
WELL		
GROUND STORAGE		
ELEVATED STORAGE		
WATER SUPPLY CONNECTION		
SURFACE WATER PLANT		

FREESE and NICHOLS
ENGINEERS · ENVIRONMENTAL SCIENTISTS · ARCHITECTS
11200 BROADWAY STREET, SUITE 2332
PEARLAND, TEXAS 77584-9786
832-456-4700 FAX 832-456-4701

CITY OF PEARLAND
WATER CAPITAL IMPROVEMENTS

DATE: JUNE 2010

EXHIBIT NO. 1

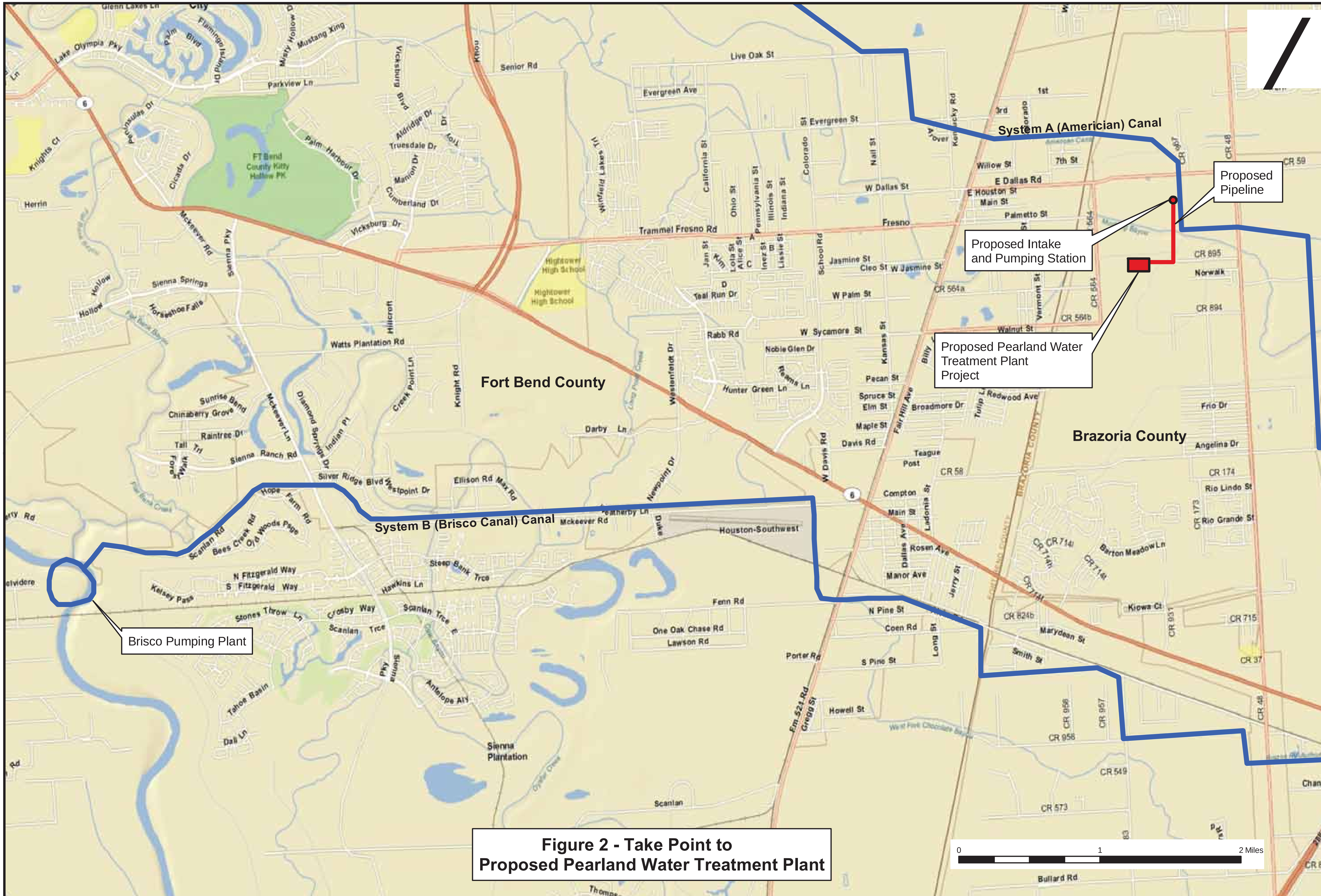


Figure 2 - Take Point to Proposed Pearland Water Treatment Plant

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Allens Creek Reservoir

DATE: November 13, 2009

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Austin County, to hold peak flows diverted from the Brazos River. Run-of-river diversions to the reservoir are indexed to in-stream flow levels. Water would be available to meet demands in Austin, Brazoria, Fort Bend, Galveston, Harris and Waller Counties.

SUPPLY QUANTITY: 99,650 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $222,752,400 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $168 per acre-foot allocated

Water Management Strategy Analysis Description

Introduction:

The Allens Creek Reservoir site is located on Allens Creek, a tributary to the Brazos River in Austin County, 1 mile north of the City of Wallis (see Figure 1). The site was originally permitted by Houston Lighting and Power as a cooling water reservoir for a proposed nuclear power plant. The site was later jointly purchased by the Brazos River Authority and the City of Houston. A water right permit has been issued for this project to the Texas Water Development Board, Brazos River Authority (BRA) and the City of Houston for use of 99,650 acre-feet per year for municipal, industrial and irrigation purposes. The water is permitted for inter-basin transfer to the San Jacinto and San Jacinto-Brazos basins. 70% of the permit (69,750 acre-feet per year) is owned by the City of Houston, and 30% of the permit (29,900 acre-feet per year) is owned by the BRA. The maximum dam height is 53-feet, and the conservation storage is approximately 145,500 acre-feet at an elevation of 121.0 feet msl.

Analysis:

This project is configured as a scalping reservoir that would divert peak (storm water) flows from the Brazos River and impound these flows into the reservoir to create storage yield. The permit conditions are based upon the consensus criteria for environmental flow needs. Specifically when monthly flows in the Brazos River before this diversion are above the naturalized median flow, diversions shall not cause the flow to fall below that naturalized median flow. When monthly flows in the Brazos River before this diversion are below median but above the above the naturalized 25th percentile flow, diversions shall not cause the flow to fall below that naturalized 25th percentile flow. When monthly flows in the Brazos River before this diversion are less than the naturalized 25th percentile flow, diversions shall not cause the flow to fall below 734 cfs. Additionally, the permit requires the following instantaneous flow rates to be met immediately downstream of the diversion point before diversions may be made.

Table 1
Required Minimum Downstream Flow Rates (cfs)

JAN	FEB	MAR	APR	MAY	JUN
795	795	812	882	882	1,017
JUL	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
1,017	1,017	882	812	812	795

The Brazos River Authority has applied to the TCEQ for a Systems Operations Permit, which would increase the yield of their reservoir system. Currently, the Allens Creek Reservoir is included in the BRA System model, potentially generating additional system yield (in addition to the original 99,650 acre-feet per year yield). The cost data used in this plan was obtained from the permitting studies for Allens Creek Reservoir, adjusted to September 2008 prices.[1]

Water User Group Application:

The water from the Allens Creek Reservoir may be used to serve municipal, industrial and irrigation customers in Austin, Brazoria, Fort Bend, Galveston, Harris and Waller Counties. The water may be diverted directly from the reservoir. Delivery to downstream customers using the bed and banks of the Brazos River would require a subsequent permit.

Environmental Impact:

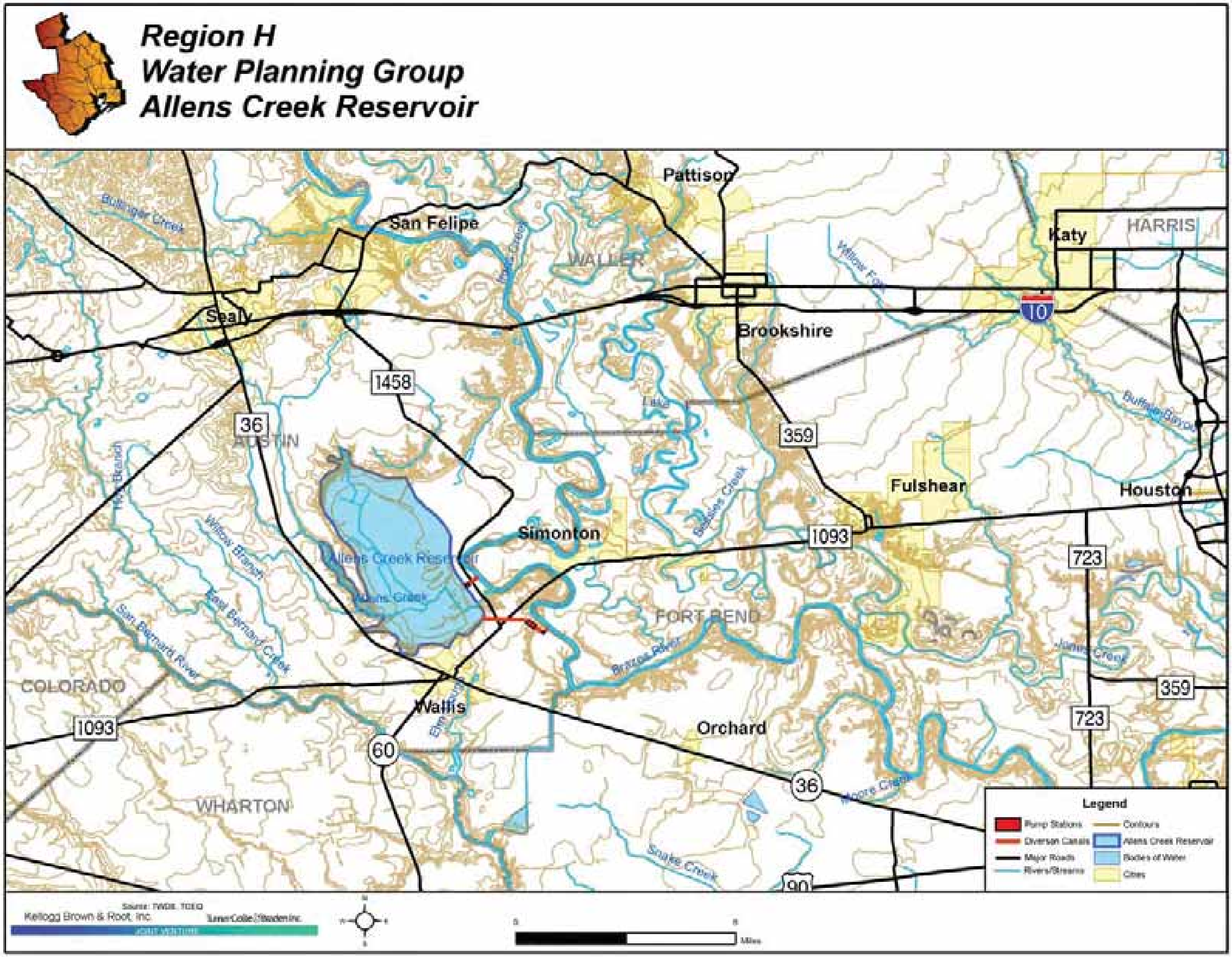
Approximately 7,000 acres of land will be inundated, and the overall site will impact approximately 1,700 acres of cropland, 2,000 acres of bottomland forest, 100 acres of bluff forest, 3,900 acres of grass. The most significant wetland area on the site is Alligator Hole, which contains approximately 600 acres of the largest remaining tract of bottomland forest[1]. The dam face has been configured to minimize wetlands associated impacts, and specifically excludes Alligator Hole from the project area.

A Wildlife Habitat Appraisal was performed for the Texas Parks and Wildlife Department. No threatened or endangered species have been found on the site. The quality of the habitat at the reservoir site is mostly degraded by extensive agriculture usage. Environmental impacts were rated as moderate to small.

Issues and Considerations:

This location has been designated as a unique reservoir site by the Texas Legislature. The project sponsors have obtained a water right permit. There are two designated diversion points on for the Allens Creek Reservoir. The nearer, upstream point is located on an oxbow of the Brazos River, which is at risk of becoming isolated from the main stem of the river at some point in the future. The lower diversion point is farther away, requiring approximately one mile of intake canal between the pump station and the reservoir. The canal will require a two road crossings (inverted siphons).

[1] Wildlife Habitat Appraisal for The Proposed Allens Creek Reservoir Site.; University of Houston Clear Lake 1995 for Texas Parks and Wildlife Department (TPWD), Resource Protection Division.



Region H
Water Planning Group
Allens Creek Reservoir
Pattison
San Felipe
WALLER
Katy
HARRIS
Sealy
Brookshire
1458
36
AUSTIN
359
Fulshear
Houston
Simonton
1093
723
Allens Creek Reservoir
FORT BEND
Brazos River
COLORADO
Wallis
359
1093
Orchard
723
60
36
WHARTON
90
Legend
Pump Stations
Diversion Canals
Major Roads
Rivers/Streams
Contours
Allens Creek Reservoir
Bodies of Water
Cities
Kellogg Brown & Root, Inc.
Miles

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: GCWA Off-Channel Reservoir

DATE: July 22, 2010

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Brazoria County, to hold peak flows diverted from the Brazos River to increase the firm yield of GCWA water rights. Water would be available to meet demands in Brazoria County.

SUPPLY QUANTITY: 39,500 acre-feet

SUPPLY SOURCE: Brazos River via GCWA canal system

IMPLEMENTATION DECADE: 2030

TOTAL STRATEGY COST: $197,448,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $827 per acre-foot

Water Management Strategy Analysis Description

Introduction:

Currently, a portion of the water rights held by GCWA are not firm on a monthly basis during the summer months. This period of interruptible reliability coincides with high demands driven by summer flooding of rice fields. The GCWA Off-Channel Reservoir is proposed for construction in Brazoria County and would store peak flows in the GCWA canal system diverted from the Brazos River in order to increase the firm yield of GCWA water rights.

Analysis:

The GCWA Off-Channel reservoir was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 30 feet and 1:6 sideslope. Total project size was varied to determine a volume-yield relationship. The optimum volume-yield relationship was found to occur for and 82,500 ac-ft reservoir, which resulted in an increase in firm yield of 39,500 acre-feet. Costs were developed assuming the reservoir as described with a small on-channel weir and 20 MGD pump station. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the GCWA Off-Channel Reservoir would be expected to serve manufacturing demands in Brazoria County in the Brazos and San Jacinto Brazos basins. Delivery of water would be via the GCWA canal system.

Environmental Impact:

The Gulf Coast Water Authority (GCWA) Off-channel Reservoir was developed using diversions from current GCWA run-of-river rights in the Brazos and San Jacinto-Brazos Basins using existing environmental flow restriction present in the WAM models. Additional environmental flow restrictions were not included in the evaluation since the strategy was developed to optimize the yield of existing water rights and did not consider a new water right or diversion point. As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,000 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; the reservoir would not be suitable to meet the needs of the local rice industry. Manufacturing is the most likely customer for this project as it can support the unit cost and is projected to have needs during the planning period.

Table 1
GCWA Off-Channel Reservoir Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$86,542,053	$ 86,542,053
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$35,196,653	$ 35,196,653
3	LAND & EASEMENTS	1	LS	$27,143,490	$ 27,143,490
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$27,143,490	$ 27,143,490
5	INTEREST DURING CONSTRUCTION	1	LS	$21,422,326	$ 21,422,326
	PROJECT COST				**$ 197,448,012**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ 13,122,698	$ 13,122,698	$ 13,122,698	$ 13,122,698
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ 2,781,000	$ 2,781,000	$ 2,781,000	$ 2,781,000
3	PUMPING ENERGY COSTS	$ -	$ -	$ 16,775,272	$ 16,775,272	$ 16,775,272	$ 16,775,272
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ 32,678,970**	**$ 32,678,970**	**$ 32,678,970**	**$ 32,678,970**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 4,091,321	$ 4,091,321
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$81,749,282	$ 81,749,282
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$701,449.56	$ 701,450
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 86,542,053**

Table 1
GCWA Off-Channel Reservoir Cost (continued)

ALL FACILITIES

OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 4,091,321	$ 61,370
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previo	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$81,749,282	$ 2,043,732
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 701,450	$ 17,536
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 2,122,638**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Millican Reservoir – Panther Creek Dam Site[1]

DATE: January 2, 2010

SUMMARY

STRATEGY DESCRIPTION: Construction of a reservoir on the Navasota River in Brazos, Grimes, and Madison Counties.

SUPPLY QUANTITY: 194,500 acre-feet per year

SUPPLY SOURCE: Navasota River / Brazos River Basin

IMPLEMENTATION DECADE: 2040

TOTAL STRATEGY COST: $1,159,907,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $1,241 per acre-foot (for Region H allocated portion only – full utilization would reduce annual unit cost to $424 per acre-foot)

Water Management Strategy Analysis Description

Introduction:

The dam site is located on the Navasota River due east of Bryan-College Station at Highway 30. This site is primarily in Brazos, Grimes, Madison counties. It exists within the Brazos basin and is located within Regions G and H. This site was investigated for flood control and water supply and water supply only. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It has an upstream drainage area of approximately 1,821 square miles. The dam is proposed with a top of conservation pool at 263.0 feet. This reservoir site was considered in the 2006 RWP over the Millican Reservoir Bundic site because of its greater yield.

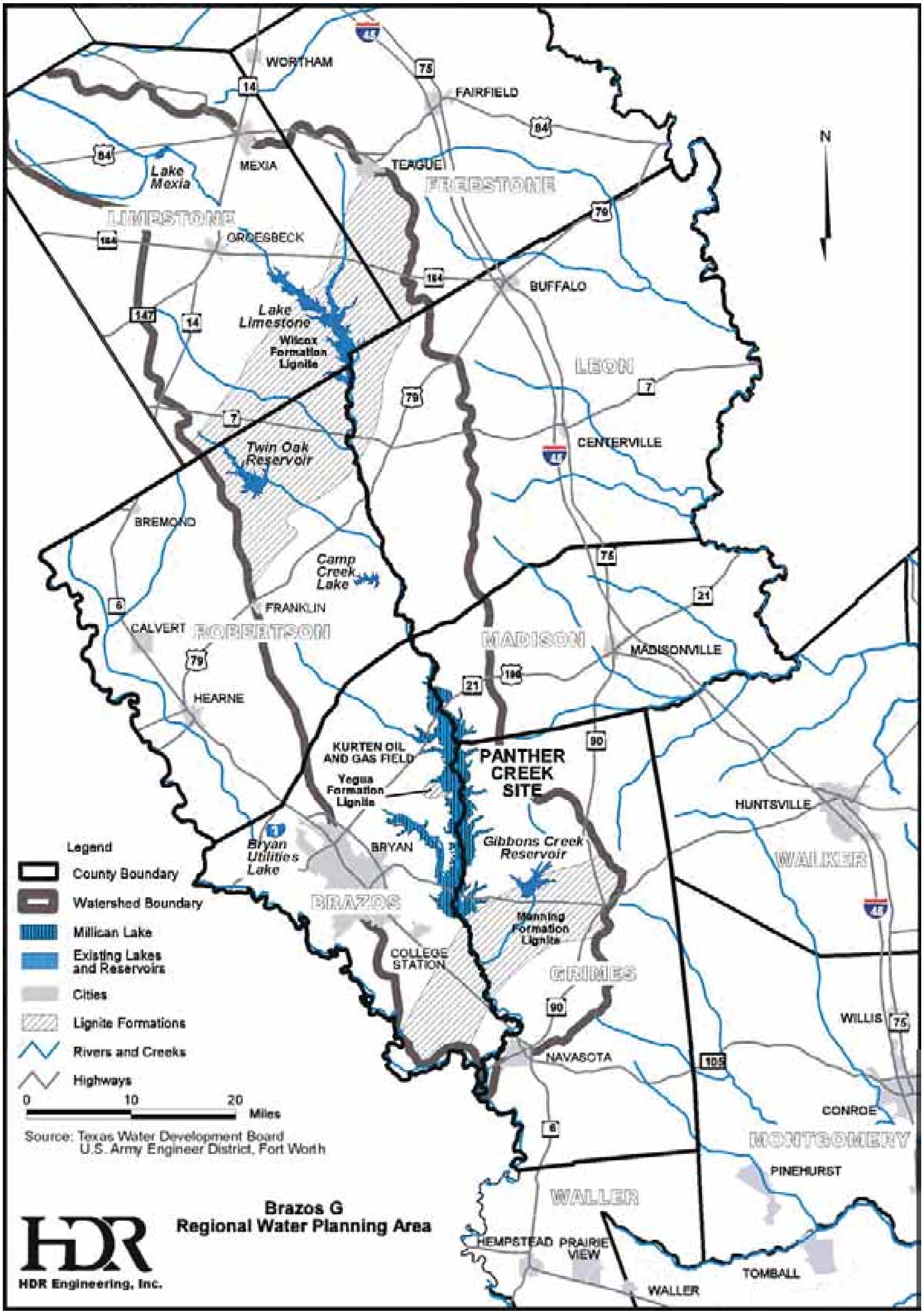
Analysis:

Analysis of the Millican Reservoir (Panther Creek Dam) site was carried out as part of the Region G 2001 RWP. This study determined a yield of 235,200 acre-feet per year. A subsequent study in the Region G 2011 RWP revised this estimate to 194,500 acre-feet per year, which would be shared between Regions G and H. *Figure 1* shows the area of the envisioned project.

Project costs for the Panther Creek project were developed by Region G for the Region G 2011 Draft IPP.

[1] This memorandum was prepared using information in the 2001 and 2011 Region G Regional Water Plans.

Figure 1
Millican Reservoir – Panther Creek Dam Site



Water User Group Application:

The water from Millican Reservoir may be used to serve municipal, industrial and irrigation customers in Brazoria, Fort Bend, Galveston, and Harris Counties.

Environmental Impact:

The Millican Reservoir – Panther Creek Dam Site was preliminarily found to involve moderate to high environmental effects:

- Probable high impact on environmental water needs and instream flows in the Navasota River, below the reservoir, and Brazos River below the Navasota River confluence.
- Probable high impact on fish and wildlife habitat in general, including one federally listed endangered plant species. Inundated area would include 17,000 acres of mixed bottomland hardwood.
- Probable high impact on cultural resources.
- Mitigation would require acquisition of at least 64,000 acres of additional land with very high costs.

A summary of environmental issues for the Panther Creek Dam Site is presented in *Table 1*.

Table 1
Environmental Issues: Millican Reservoir – Panther Creek Dam Site

Water Management Option	Millican Reservoir (Navasota River in Brazos, Grimes, and Madison Counties)
Implementation Measures	Dam and reservoir covering 71,032 acres;
Environmental Water Needs / Instream Flows	Probable high impact on instream flows in Navasota River below the dam and reservoir and Brazos River below confluence;
Bays and Estuaries	Probable cumulative impact to limited areas of coastal marsh;
Fish and Wildlife Habitat	Probable high impact to species in general, possible low impact to State-listed species: White-tailed hawk, White-faced ibis, American swallow-tailed kite, Wood stork, Bachmans sparrow, Arctic peregrine falcon, Texas horned lizard, Blue sucker, Creek chubsucker, Timber rattlesnake;
Cultural Resources	Probable high impact
Threatened and Endangered Species	Probable high impact on: Navasota ladies-tresses,
Comments	Inundated area includes 17,000 acres of mixed bottomland hardwood; Mitigation requirements: May require over 64,000 acres with very high costs.[1]

[1] Texas Parks and Wildlife Department, "An Assessment of Direct Impacts to Wildlife Habitat from Future Water Development Projects," 1990.

Issues and Considerations:

Inundation of the Yegua Lignite, Kurten oil and gas field, inundation of marsh areas. At a minimum, implementation steps for the project include the following:

- TCEQ Water Right and Storage Permit
- U.S. Army Corps of Engineers Sections 10 and 404 dredge and fill permits for reservoirs and pipelines impacting wetlands or navigable waters of the U.S
- TPWD Sand, Gravel, and Marl Permit for construction in state owned streambeds
- NPDES Storm Water Pollution Prevention Plan
- GLO easement for use of the state-owned streambed
- Section 404 certification from the TCEQ related to the Clean Water Act

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Potential Reservoir Sites

DATE: November 3, 2009

Introduction:

Although Region H is projected to have a net water supply surplus throughout the majority of the planning period, the surplus is predominantly located in the northern and eastern portions of the region. The projected supply shortages are located in the western and southern portions of the region. Texas law allows for establishment of groundwater planning districts. Within Region H, the Harris-Galveston Coastal Subsidence District requires by 2010 that no more than 20% of the water supply can be from groundwater within those counties. The Fort Bend subsidence District requires that by 2025 no more than 40% of their Area A's supply can be from groundwater. The reduction in groundwater use must be made up by increase in surface water. Constructing new reservoirs is one potential strategy to meet the projected shortages.

Analysis:

A review of previously published reservoir studies and basin master plans was conducted to identify potential water supply reservoirs which could serve Region H. These reports are summarized in the attached Potential Reservoir Site Descriptions. The water quantities shown reflect the firm yield of the proposed reservoir.

The development of any new reservoir project will involve extensive technical planning, environmental studies, and permitting (state and federal) prior to construction. The locations of potential reservoir sites are shown in Figure 1. The planning upon which the following technical memos are based is at an initial conceptual level to simply compare and contrast multiple potential projects. No detailed environmental analysis has been performed at this time except for the Allens Creek Reservoir project. Additional engineering and environmental investigations will be performed on any of the projects which are selected for further analysis.

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs within a planning region. Two surface water reservoir projects were recommended in the 2006 Regional Water Plan. These two are Allens Creek Reservoir and Little River Off-Channel Reservoir.

Allens Creek Reservoir

DESCRIPTION: The Allens Creek Reservoir site is located on Allens Creek, a tributary to the Brazos River in Austin County, 1 mile north of the City of Wallis (see Figure 1). The site was originally permitted by Houston Lighting and Power as a cooling water reservoir for a proposed nuclear power plant. The site was later jointly purchased by the Brazos River Authority and the City of Houston. A water right permit has been issued for this project to the Texas Water Development Board, Brazos River Authority (BRA) and the City of Houston for use of 99,650 acre-feet per year for municipal, industrial and irrigation purposes. The water is permitted for inter-basin transfer to the San Jacinto and San Jacinto-Brazos basins. 70% of the permit (69,750 acre-feet per year) is owned by the City of Houston, and 30% of the permit (29,900 acre-feet per year) is owned by the BRA. The maximum dam height is 53-feet, and the conservation storage is approximately 145,500 acre-feet at an elevation of 121.0 feet msl.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $222,752,400 (Costs rounded to nearest $100)

QUANTITY OF WATER: 99,650 acre-feet per year

LAND IMPACTED: 7,000 acres

PURPOSE: Municipal, Industrial, and Irrigation Water Supply and Recreation

ENVIRONMENTAL IMPACT: The dam face has been configured to minimize wetlands associated impacts. No endangered species have been found on the site. Environmental impacts can be rated as moderate to small. A more recent detailed study has been completed and additional data can be provided as required.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This project has been designated as a unique reservoir site by the Texas Legislature. The project sponsors have initiated the water rights permitting process.

Description	Cost*
Total Project Cost	$222,752,400
Annual Cost (6%, 40 Years)	$14,804,467
Annual O&M	$3,341,286
Total Annual Cost	$18,145,753
Unit Cost of Water (per acre-foot)	$182

* Cost data from TNRCC Permit Application for Allens Creek Reservoir. Please note that unit cost assumes full allocation of reservoir supply.

Bedias Reservoir

DESCRIPTION: This site is located principally within Madison County about 3.5 miles west of Hwy. 75 crossing. The site includes Bedias and Caney Creeks. This site exists within the Trinity River Basin and is in Regions G and H. The upstream drainage area is approximately of 395 square miles. The dam is proposed with a maximum height of 45 feet and a normal pool elevation of 230.0 feet msl. The reservoir would have conservation storage of 192,700 acre-feet and would inundate about 10,000 acres. This project is currently included within the TRA Trinity River Basin Master Plan. As planned, the Trinity River Authority and the San Jacinto River Authority would jointly develop this project for their water users within the lower Trinity and San Jacinto river basins, respectively.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $247,241,628

QUANTITY OF WATER: 75,430 acre-feet per year

LAND IMPACTED: 27,400 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 7,300 acres of bottomland hardwoods, 7,000 acres of grasslands, and 7,000 acres of post oak-elm-hackberry forest. Probable moderate to high impacts on wildlife habitats.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This project requires an interbasin transfer to the San Jacinto Basin.

Description	Cost*
Total Project Cost	$247,241,628
Annual Cost (6%, 40 Years)	$16,432,058
Annual O&M	$1,415,877
Total Annual Cost	$17,847,935
Unit Cost of Water (per acre-foot)	$237

* Cost data from TWDB Report 370.

Little River Reservoir

DESCRIPTION: This site is located on the main stem of the Little River just upstream from its confluence with the Brazos River. It would be near the City of Cameron, Texas, within Milam County. It is located within the Brazos River basin within Region G. The site would have a surface area of 35,000 acres and a storage volume of about 930,000 acre-feet. The approximately 7,500 square mile upstream drainage area is uncontrolled which produces a significant yield. The fully developed site would have a yield of about 119,000 acre-feet per year. The Brazos River Authority and the Gulf Coast Water Authority propose this project for joint development for their water customers within the Brazos and the San Jacinto-Brazos river basins. Brazos River Authority customers would exist within both Regions G and H, making this project truly regional in scope.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $556,520,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 119,000 acre-feet per year

LAND IMPACTED: 35,600 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: Probable moderate to high impacts on environmental water needs and instream flows on the Little River. Reservoir would conflict with a Potential Unique Stream Segment on Little River in Milam County. Possible low to moderate impacts on fish and wildlife habitat, including possible low impact on one federally listed bird species and an endangered amphibian species. Probable high impact on cultural resources, especially near the City of Cameron.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Opposition to the project has arisen among landowners and citizens in Bell and Milam Counties because of the inundation of prime farmland, anticipated condemnation of land for the reservoir, disruption of riparian habitat, and social and economic impacts in the area of the proposed reservoir.

Description	Cost*
Total Project Cost	$556,520,000
Annual Cost (6%, 40 Years)	$36,986,000
Annual O&M	$2,307,000
Total Annual Cost	$39,293,000
Unit Cost of Water (per acre-foot)	$328

* Cost data from Region G 2011 Draft IPP

(Lower) Lake Creek Reservoir

DESCRIPTION: Approximately 5 miles southwest of Conroe on Lake Creek within southern Montgomery County. The site is located within the San Jacinto River Basin and is in Region H. The dam is proposed with a maximum height of 69 feet and a normal pool elevation of 194.0 feet msl. The reservoir would have conservation storage of approximately 411,900 acre-feet and would inundate about 13,100 acres. This project was studied by the Bureau of Reclamation in 1988 for the SJRA and deemed the preferred site of all the potential San Jacinto River basin sites. Bureau of Reclamation concluded that this site has a positive benefit-to-cost (B/C) ratio.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $480,777,860

QUANTITY OF WATER: 67,200 acre-feet per year

LAND IMPACTED: 19,400 acres

PURPOSE: Municipal Water Supply and Recreation

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, pine forest, and 1,800 acres of shrubland and grasses. Probable high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Significant clearing and relocation of utilities and roadways is required.

Description	Cost*
Total Project Cost	$480,777,860
Annual Cost (6%, 40 Years)	$31,953,235
Annual O&M	$7,211,668
Total Annual Cost	$39,164,903
Unit Cost of Water (per acre-foot)	$583

*Information collected from River Authorities, 1999.

Millican (Panther Creek Dam) Reservoir

DESCRIPTION: The dam site is located on the Navasota River due east of Bryan-College Station at Highway 30. This site is primarily in Brazos, Grimes, Robertson and Leon counties. It exists within the Brazos basin and is located within Regions G and H. This site was investigated for flood control and water supply and water supply only. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It has an upstream drainage area of approximately 1,821 square miles. The dam is proposed with a top of conservation pool at 263.0 feet.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $1,159,907,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 194,500 acre-feet per year

LAND IMPACTED: 71,000 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 17,000 acres of bottomland hardwoods, 28,400 acres of grassland, and 500 acres of emergent wetland. Probable high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Inundation of the Yegua Lignite, Kurten oil and gas field, inundation of marsh areas.

Description	Cost*
Total Project Cost	$1,159,907,000
Annual Cost (6%, 40 Years)	$77,087,000
Annual O&M	$5,401,000
Total Annual Cost	$82,488,000
Unit Cost of Water (per acre-foot)	$424

* Cost data from Region G 2011 Draft IPP. Note that calculated unit cost assumes full use of reservoir supply.

Millican (Bundic Crossing Dam) Reservoir

DESCRIPTION: The dam site is located on the Navasota River, immediately north of Highway 190, northeast of Bryan-College Station. The site is primarily within Brazos, Madison, Robertson and Leon counties. It exists within the Brazos basin and is located within Regions G and H. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It had historically been titled the Navasota Reservoir project. This site is smaller in configuration than the Millican-Panther Creek site with an upstream drainage area of about 1,418 acres. The dam height is 84.0 feet with a top of conservation pool at 277 msl.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $720,224,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 36,990 acre-feet per year

LAND IMPACTED: 14,630 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Avoids Manning and Yegua lignite, avoids Kurten oil and gas field, avoids the Wilcox lignite in the upper river reaches and avoids significant bottomland hardwood population. Size of lake would be constrained by the Wilcox lignite, and inundation of marsh area upstream of Old San Antonio Road. Probable moderate to high environmental and instream flows impacts. The inundation area impacts approximately and 9,210 acres of mixed Bottomland Hardwood Forest, 4,086 acres of Grasses/Forbs, and 1,334 acres of Post Oak Woods.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Limited information is available. There are a small number of oil wells in the inundation footprint.

Description	Cost*
Total Project Cost	$720,224,000
Annual Cost (6%, 40 Years)	$47,867,000
Annual O&M	$5,084,000
Total Annual Cost	$52,951,000
Unit Cost of Water (per acre-foot)	$1,431

* Cost data from Region G 2011 Draft IPP. Note that calculated unit cost assumes full use of reservoir supply.

Tehuacana Reservoir

DESCRIPTION: This site is located primarily within Freestone County north of Fairfield off FM 488. The site is located on Tehuacana Creek within the Trinity River basin. It exists within Region C. The project would have an upstream drainage basin of about 350 square miles. It is proposed to have conservation storage of about 337,000 acre-feet. The dam height would be 81 feet with a normal pool elevation of 315 feet. The reservoir would inundate about 14,900 acres. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $198,149,831

QUANTITY OF WATER: 41,900 acre-feet per year

LAND IMPACTED: 19,000 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: Some endangered species have been identified. Major ecological concerns have been expressed. There are approximately 7,000 acres of bottomland hardwoods. Probable moderate to high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced Report (Region C 2006 RWP).

Description	Cost*
Total Project Cost	$198,149,831
Annual Cost (6%, 40 Years)	$13,169,342
Annual O&M	$639,269
Total Annual Cost	$13,808,611
Unit Cost of Water (per acre-foot)	$330

* Cost data from Region C 2001 Water Plan.

Tennessee Colony Reservoir

DESCRIPTION: Project is located in Anderson and Freestone Counties, about 22 miles west of Palestine, Texas. It exists within the middle Trinity basin within Regions C and I. This project is on the main stem of the Trinity River so the upstream drainage area is approximately 12,700 square miles. The reservoir would inundate approximately 80,000 acres at a normal pool elevation of 265.0 msl. The total controlled storage is about 1,290,000 acre-feet. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $2,918,602,710

QUANTITY OF WATER: 405,800 acre-feet per year

LAND IMPACTED: 147,200 acres

PURPOSE: Municipal Water Supply and Recreation

ENVIRONMENTAL IMPACT: Some endangered species have been identified. Major ecological concerns have been expressed. A large lignite deposit is located on the reservoir site. There are 34,800 acres of bottomland hardwoods. Probable high environmental and instream flow impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Development of this project would significantly reduce the current yield of Lake Livingston.

Description	Cost*
Total Project Cost	$2,918,602,710
Annual Cost (6%, 40 Years)	$193,974,819
Annual O&M	$43,779,041
Total Annual Cost	$237,753,860
Unit Cost of Water (per acre-foot)	$586

*Cost data from Water for Texas, A Concensus-Based Update to the State Water Plan, TWDB, 1997

Caney Reservoir

DESCRIPTION: This site is located within Trinity County about 10 miles east of the town of Trinity. The project is on Caney Creek about 5 miles from the confluence of the Trinity River. It is in the Trinity River Basin and exists within Region H. This project would have an upstream drainage area of approximately 68 square miles. The conservation storage is about 31,000 acre-feet. The dam would have a maximum height of about 42 feet and the normal pool elevation is at about 166.0 feet msl. The reservoir would inundate a minimum of about 2,000 acres. This project is included within the TRA Trinity River Basin Master Plan. This project has historically been considered a local project suited for water users within Trinity County.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 2,000 acres

PURPOSE: Water Users within Trinity County

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost*
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Cleveland Reservoir

DESCRIPTION: This site is located in San Jacinto County approximately 8 miles northwest of Cleveland on the East Fork of the San Jacinto River. It exists within the San Jacinto River Basin and is located within Region H. The upstream drainage area is about 310 square miles. The dam height is proposed at an elevation of 71.0 feet msl.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $281,805,890

QUANTITY OF WATER: 65,900 acre-feet per year

LAND IMPACTED: 33,000 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: This site is partially located within the Sam Houston National Forest. Some endangered species have been identified. There are about 2,300 acres of bottomland hardwoods, 7,000 acres of oak-hickory-pine forest, 2,000 acres of grassland.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost*
Total Project Cost	$281,805,890
Annual Cost (6%, 40 Years)	$18,729,252
Annual O&M	$4,227,088
Total Annual Cost	$22,956,340
Unit Cost of Water (per acre-foot)	$348

*Cost data from Water for Texas, A Consensus-Based Update to the State Water Plan, TWDB, 1997

Harmons Reservoir

DESCRIPTION: This site is located within Walker County about 6 miles northeast of the City of Huntsville. The project is on Harmons Creek within the Trinity River Basin. It is located within Region H. The upstream drainage area is approximately 43 square miles creating conservation storage of about 20,000 acre-feet. The dam would have a height of about 45 feet and the normal pool elevation would be at about 188.0 feet msl. This reservoir would inundate approximately 1,100 acres. This site has historically been considered for local water supply purposes within Walker County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 10,100 acre-feet per year

LAND IMPACTED: 1,100 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Humble Reservoir

DESCRIPTION: This site is located near the confluence of Spring and Cypress creeks about one mile northwest of the City of Humble on the West Fork of the San Jacinto River. This site is located within Harris and Montgomery Counties within the San Jacinto River basin and exists within Region H. This site was studied by Bureau of Reclamation for the SJRA and eliminated from detailed analysis due to high development costs, per unit costs of water and/or environmental impacts.

<u>FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED</u>

COST: Detailed costs have not been developed.

QUANTITY OF WATER:

LAND IMPACTED: 35,800 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This site now exists within the backwater of Lake Houston and within highly developed urban landuses.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Hurricane Bayou Reservoir

DESCRIPTION: This site is located within Houston County about 6 miles west of the City of Crockett. The project exists on Hurricane Bayou about four miles east of its confluence with the Trinity River. It exists within the Trinity River basin and within Region I. This project has an upstream drainage basin of about 109 square miles and it would have conservation storage of about 50,000 acre-feet. The dam would have a proposed height of about 40 feet and the normal pool elevation would be at elevation 210.0 feet msl. The reservoir would inundate about 3,200 acres. This project has historically been viewed to serve local municipal water supply users within Houston County. This project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 17,900 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Long King Reservoir

DESCRIPTION: This site is located within Polk County about 6 miles north of the City of Livingston. The project is on Long King Creek within the Trinity River basin and exists within Region H. The upstream drainage basin is about 96 square miles, which would produce conservation storage of about 44,000 acre-feet. The dam would have a maximum height of about 40 feet. This site would inundate about 3,200 acres. This project has been historically viewed to serve local municipal water users within Polk County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 20,200 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Lower Keechie Reservoir

DESCRIPTION: This site is located in Leon County about 10 miles southeast of Centerville. This site exists on Lower Keechi creek within the Trinity River basin and it is within Region H. The dam site is about 4 miles upstream from the confluence of Lower Keechi Creek and the Trinity River. The upstream drainage area is about 160 square miles and it would have conservation storage of approximately 74,000 acre-feet. The dam would have a height of about 55 feet with a normal pool elevation of about 225.0 feet msl. This reservoir would inundate approximately 4,000 acres. This project has historically been viewed to serve local municipal water supply users within Leon County. This project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 25,800 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Mustang Reservoir

DESCRIPTION: This site is located in Houston County about 12 miles southeast of Crockett. The dam site is on Mustang Creek within the Trinity River basin. The project exists within Regions H and I. The upstream drainage basin is about 70 square miles and would create conservation storage of about 32,000 acre-feet. The dam is proposed with a height of about 48 feet and the normal pool elevation would be at about 233.0 feet msl. The reservoir would inundate about 2,900 acres. This site has historically been viewed to serve local municipal water users within Houston County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 2,900 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Nelsons Reservoir

DESCRIPTION: This site is located in Walker County about 8 miles due north of the City of Huntsville. The project exists on Nelsons Creek within the Trinity River basin about 4 miles upstream of the confluence with the Trinity River. This site is within Region H. The upstream drainage basin is about 77 square miles and would create conservation storage of about 35,000 acre-feet. The dam would have a height of 28 feet and the normal pool elevation would be at about 201.0 feet msl. This project would inundate about 3,200 acres. This project has been historically viewed to serve local municipal water users within Walker County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 17,900 acre-feet per year

LAND IMPACTED: 3,200 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Upper Keechi Reservoir

DESCRIPTION: This site is located within Freestone County near its boundary with Leon County. The project is on Upper Keechi Creek about 8 miles upstream of its confluence with the Trinity River. The dam site is about 2 miles upstream of Highway 79. It is within the Trinity River basin and within Region C. The upstream drainage basin is about 98 square miles and the project would have about 45,000 acre-feet of conservation storage. The dam height would be about 40 feet and the normal pool elevation would be at 308.0 msl. The reservoir would inundate approximately 3,300 acres. This site has been viewed to serve local municipal water users within Freestone County. The project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 3,300 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Spring Creek Reservoir

DESCRIPTION: This site is located on Spring Creek on the Harris and Montgomery County border, approximately 4 miles southwest of the Woodlands. This site exists within the San Jacinto River basin and is located within Region H. Due to its relatively small yield, it is limited for use within Montgomery County.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $31,409,870

QUANTITY OF WATER: 7,500 acre-feet per year

LAND IMPACTED: 1,000 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$31,409,870
Annual Cost (6%, 40 Years)	$2,087,548
Annual O&M	$471,148
Total Annual Cost	$2,558,696
Unit Cost of Water (per acre-foot)	$341

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Fulshear Reuse

DATE: July 20, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.

SUPPLY QUANTITY: Up to 287 acre-ft/year in 2020 and 430 acre-ft/year in 2030 and beyond

SUPPLY SOURCE: Groundwater and surface water based WWTP discharges in Fort Bend County (1 MGD estimated wastewater flow in 2020 and 1.5 MGD estimated wastewater flow in 2030-2060)

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $566,600 capital cost (estimated as $564 per acre-foot of plant capacity based on Wastewater Reuse for Municipal Irrigation WMS). (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $502 per ac-ft based on assumption above.

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Fort Bend Subsidence District (FBSD) has mandated the reduction in groundwater withdrawals in an effort to curb subsidence within the county. The North Fort Bend Water Authority (NFBWA) has provided incentive to communities who implement reclaimed water strategies in an effort to reduce the overall need for surface water conversion.

Fulshear, in conjunction with the Cross Creek Ranch development have chosen to pursue a reuse strategy in order to offset total surface water demand. This strategy is in the beginning phase of development and is expected to be implemented by the year 2020.

Analysis:

A preliminary study of this WMS has been carried out based on the build-out population of the Cross Creek Ranch development. This build-out will occur in 2025 and approximately two-thirds of the community is expected to be contributing wastewater flows to the proposed reuse system by the year 2020.

Water User Group Application:

City of Fulshear

Issues and Considerations:

This strategy is in the early phases of development and will require permitting through Section 210 in addition to conceptual and detailed design.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Houston Indirect Reuse

DATE: November 13, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Wastewater reclamation for municipal and industrial reuse from 35 City of Houston wastewater treatment plants in the City of Houston service area.

SUPPLY QUANTITY: Up to 160,000 ac-ft per year plus any future flows from WWTP facility expansions

SUPPLY SOURCE: Effluent from thirty-five City of Houston wastewater treatment plants as listed below A percentage of up to 580,923 ac-ft per year of effluent is assumed to be available.

TOTAL STRATEGY COST: Based on relative location of reuse water source and need

ANNUAL UNIT WATER COST: $402 to $1,232 per ac-ft.

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The purpose of this analysis is to address the potential use of reclaimed wastewater to meet projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to supplement existing water supplies that serve municipal and industrial demands within the City of Houston service area. Under this strategy, wastewater currently discharged into 7 area watersheds will receive further treatment and will be offered as an additional supply sources to area municipal and industrial users.

ANALYSIS

A review of the *Application for Authorization to Divert Existing and Future Return Flows* City of Houston Permit Application is the basis for this analysis. The project calls for collecting effluent from 35 of the city's wastewater treatment plants and using bed and banks permits to transmit the water to diversion locations. Both the discharge locations and diversion locations are listed below. Figure 1 provides a graphical representation of the potential reclaimed wastewater system.

The amount of estimated future flows through the 35 WWTPs is unknown, but future plant expansions could increase the amount of water available for reuse downstream.

List of WWTP Facilities (by Watershed):

Brays Bayou Watershed

- Southwest Wastewater Treatment Plant
- Keegans Bayou Wastewater Treatment Plant
- Beltway Wastewater Treatment Plant
- Upper Brays Wastewater Treatment Plant
- WCID 111 Wastewater Treatment Plant

Buffalo Bayou Watershed

- 69th Street Wastewater Treatment Plant
- West District Wastewater Treatment Plant
- Turkey Creek Wastewater Treatment Plant
- Park Ten Wastewater Treatment Plant

Greens Bayou Watershed

- Northeast Wastewater Treatment Plant
- FWSD #23
- Tidwell Timbers Wastewater Treatment Plant
- WCID # 76 Wastewater Treatment Plant
- International Airport Wastewater Treatment Plant
- Northbelt Wastewater Treatment Plant
- Imperial Valley Wastewater Treatment Plant
- Northgate Wastewater Treatment Plant
- Northborough Wastewater Treatment Plant
- MUD #203 Wastewater Treatment Plant
- Willowbrook Wastewater Treatment Plant

Hunting Bayou Watershed

- Homestead Wastewater Treatment Plant

Lake Houston Watershed

- Kingwood Central Wastewater Treatment Plant
- Forest Cove Wastewater Treatment Plant
- MUD #48 Wastewater Treatment Plant

Sims Bayou Watershed

- Sims Bayou Wastewater Treatment Plant
- Sims Bayou South Wastewater Treatment Plant
- WCID #47 Wastewater Treatment Plant
- Easthaven Wastewater Treatment Plant
- Chocolate Bayou Wastewater Treatment Plant
- Almeda Sims Wastewater Treatment Plant
- WCID #51
- Greensridge Wastewater Treatment Plant

White Oak Bayou Watershed

- Northwest Wastewater Treatment Plant
- Westway Wastewater Treatment Plant
- White Oak Wastewater Treatment Plant

Diversion Points (by Watershed):

Brays Bayou Watershed

- Southwest Wastewater Treatment Plant
- Macgregor Park

Buffalo Bayou Watershed

- 69th Street Wastewater Treatment Plant
- Memorial Park

Greens Bayou Watershed

- Northeast Wastewater Treatment Plant
- Brock Park

Hunting Bayou Watershed

- Homestead Wastewater Treatment Plant
- Herman Brown Park

Lake Houston Watershed

- Lake Houston Pump Station
- Northeast Water Purification Plant

Sims Bayou Watershed

- Sims Bayou Wastewater Treatment Plant
- Reveille Park

White Oak Bayou Watershed

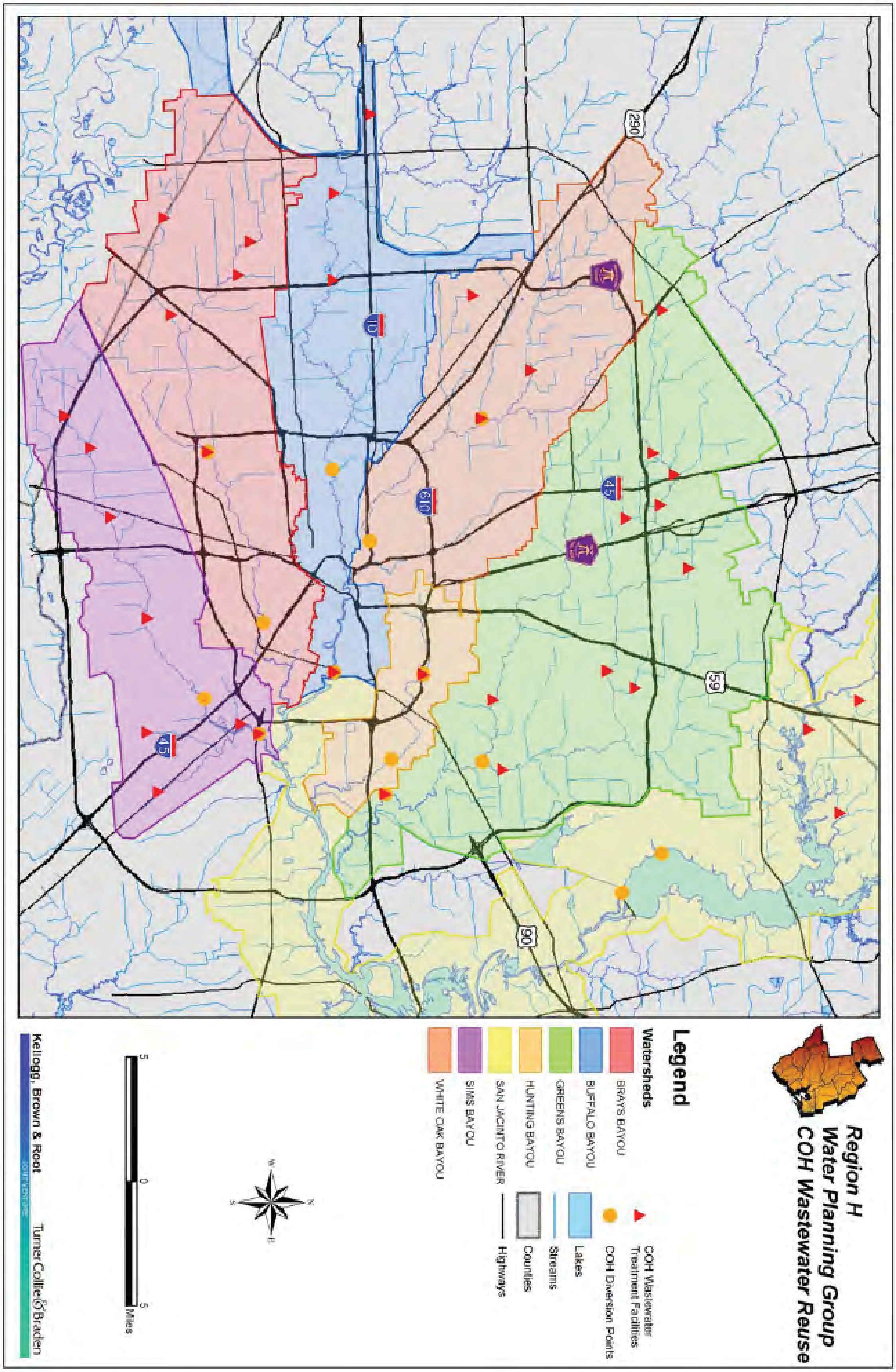
- Northwest Wastewater Treatment Plant
- Stude Park

WATER USER GROUP APPLICATION

This strategy would help to meet the growing municipal and industrial demands of the region in which the City of Houston serves. In particular, the reuse water would serve demands in the seven watersheds listed above. According to the permit application, all water not consumptively used will be returned to the San Jacinto or adjoining coastal basins at wastewater treatment plants in the City's system.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns will be addressed during the permitting process.


Region H
Water Planning Group
COH Wastewater Reuse
Legend
Watersheds
BRAYS BAYOU
BUFFALO BAYOU
GREENS BAYOU
HUNTING BAYOU
SAN JACINTO RIVER
SIMS BAYOU
WHITE OAK BAYOU
COH Wastewater Treatment Facilities
COH Diversion Points
Lakes
Streams
Counties
Highways
5
0
5
Miles
Kellogg, Brown & Root
Turner Collie & Braden
290
10
610
45
59
90

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Montgomery County MUDs 8 and 9 Reuse

DATE: July 22, 2010

SUMMARY

STRATEGY DESCRIPTION: Establishment of a bed-and-banks permit and treatment facility to supply water to Montgomery County MUDs 8 and 9 via indirect reuse, reducing dependence on groundwater.

SUPPLY QUANTITY: Up to 1,120 acre-ft/year (1 MGD)

SUPPLY SOURCE: Groundwater-based WWTP discharges to Lake Conroe, up to 132,147 acre-ft/yr (118 MGD) assumed effluent available for diversion

IMPLEMENTATION DECADE: 2020 (2016)

TOTAL STRATEGY COST: $12,245,700 capital cost (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $878 per ac-ft (based on allocated volume)

Water Management Strategy Analysis Description

Introduction:

The Lone Star Groundwater Conservation District (LSGCD) has mandated a county-wide reduction in groundwater, limiting groundwater to 70 percent of total county demands, to be met by 2015. Montgomery MUDs 8 and 9 have undertaken study of an indirect reuse methodology as an alternate means to surface water conversion for meeting the mandated groundwater reduction. The MUDs have applied to TCEQ for a permit to divert a volume equal to their WWTP discharge, less evaporative losses, from Lake Conroe. This water would be treated and used to meet water demands within the MUDs. Initial treatment plant capacity would be 0.5 MGD, scalable up to 1.0 MGD.

Analysis:

A preliminary study of this WMS has been carried out on behalf of Montgomery County MUDs 8 and 9. Results indicate that a treatment plant of 0.5 MGD capacity could reduce current groundwater usage by approximately 30 percent on an annual basis. The preliminary study is attached at the back of this memorandum.

Water User Group Application:

Diverted water would meet shortages for the Montgomery County MUD 8 and 9 WUGs.

Issues and Considerations:

This WMS is contingent on TCEQ granting a bed-and-banks permit for the groundwater-based WWTP discharge. The WMS would not be allowed to adversely impact senior water rights holders. Approval of the San Jacinto River Authority and the City of Houston would be required in order to secure or use the permit.

Water Credit Feasibility Study

Proof of Concept Report

Montgomery County
Municipal Utility District No. 8, Texas

And

Montgomery County
Municipal Utility District No. 9, Texas

STATE OF TEXAS
JOSEPH W. NORRIS
49962
LICENSED
PROFESSIONAL ENGINEER

August 2009

NRS
engineering water solutions

NRS Consulting Engineers, Inc.
Texas Registered Engineering Firm
F-2705

Outline

Introduction

This Water Credit Feasibility Study (Study) was undertaken by the Montgomery County Municipal Utility Districts No. 8 and 9 (MUDs) to determine the feasibility of constructing a surface water treatment facility within their district boundaries to take advantage of wastewater return flow credits, and thereby reduce their dependency upon groundwater resources.

The Study is in response to a Lone Star Groundwater Conservation District (Lone Star GCD) county-wide groundwater reduction mandate of 30 percent by 2015. The San Jacinto River Authority (SJRA) is currently preparing a plan that identifies the options for groundwater users in Montgomery County to comply with the Lone Star GCD mandate by converting to a central surface water treatment and distribution system. The MUDs have agreed to participate in the SJRA plan to determine their potential costs, but the present Study would be an alternative means of satisfying their groundwater reduction requirements. It is recognized that the final reduction requirement may be greater than 30 percent.

Objective

The objective of this proof of concept report is to identify any permitting or engineering fatal flaws associated with the water credit project concept.

Scope

As scoped, the Study includes two tasks:

Task 1 Proof of Concept
Task 2 Conceptual Engineering Feasibility Assessment

Task 2 will only be undertaken if authorized by the MUDs after their review and consideration of the results from Task 1. The present report, therefore, only addresses Task 1 findings.

Subtask 1.1: Data Gathering

For Task 1[1], NRS worked with the MUDs' local engineers and system operator (Hays Utility North) to compile available data, including:

A. Maps with designated jurisdictional boundaries, including land ownership and ROW easements held by the MUDs.
B. Existing documents and data for water quantity and quality information and studies by Federal, State, local, and private entities.
C. Existing water resources planning and engineering documents and reports for the study area.
D. Regional water planning data for population and water demands.
E. Water supply and treatment capacities.
F. Water and wastewater treatment and distribution infrastructure.

[1] For Task 2, additional data and information that will be required will include, at a minimum:
A. Existing water treatment costs on a per 1,000 gallon basis.
B. Existing power service agreements, costs, and sources.
C. Water quality data provided by MUDs 8 and 9.

Subtask 1.2: Proof of Concept Determination

Based on a review of the data gathered, NRS made a determination of fundamental project viability (proof of concept) based on an assessment of fatal flaws. This determination resulted in a conceptual description of:

A. Facility treatment capacity.
B. Primary water treatment process.
C. Suitability of potential facility sites.

Subtask 2.2: Permitting Requirements

In addition to the specified activities in Task 1, NRS, at the request of the MUDs, also performed some of the activities outlined for Task 2; namely, assisting the legal and engineering team retained by the MUDs to explore permits and approvals required from the Texas Commission on Environmental Quality (TCEQ), San Jacinto River Authority (SJRA), and City of Houston for the proposed water credit project. The work conducted under Task 1 did not include a complete assessment of permitting requirements necessary for project design and implementation, which will be accomplished during Task 2, if authorized.

Results and Discussion

1.1 Data Gathering

For Task 1 of the present Study, the type and quality of available data was generally adequate. Key information obtained and evaluated included: planning objectives and constraints; daily operational data for water production and wastewater discharge for the previous year; projected district build-out estimates for connections and water demands for the MUDs; and mapping data for MUDs-owned infrastructure (water and wastewater) and property. One notable information deficiency was the available raw water quality data in Lake Conroe.

Water Usage Analysis

Based on a 2008 water usage analysis conducted by the MUDs' engineers, the combined number of water connections within the MUDs boundaries was 2,873. Full build-out of the districts is expected to include a total of 5,411 connections and be achieved by 2035 (Table 1 and Figure 1).

Table 1: Summary of MUDs water usage analysis through 2035.

	Total Number of Connections	Average Daily Flow Requirement (mgd)	Peak Daily Demand Requirement (mgd)	Peak Hourly Demand Requirement (mgd)
2008	2,873	1.437	3.448	6.321
2015*	3,531	1.766	4.237	7.768
2025	4,471	2.236	5.356	9.836
2035	5,411	2.706	6.493	11.904

* The Lone Star GCD required 30 percent groundwater reduction begins in 2015.

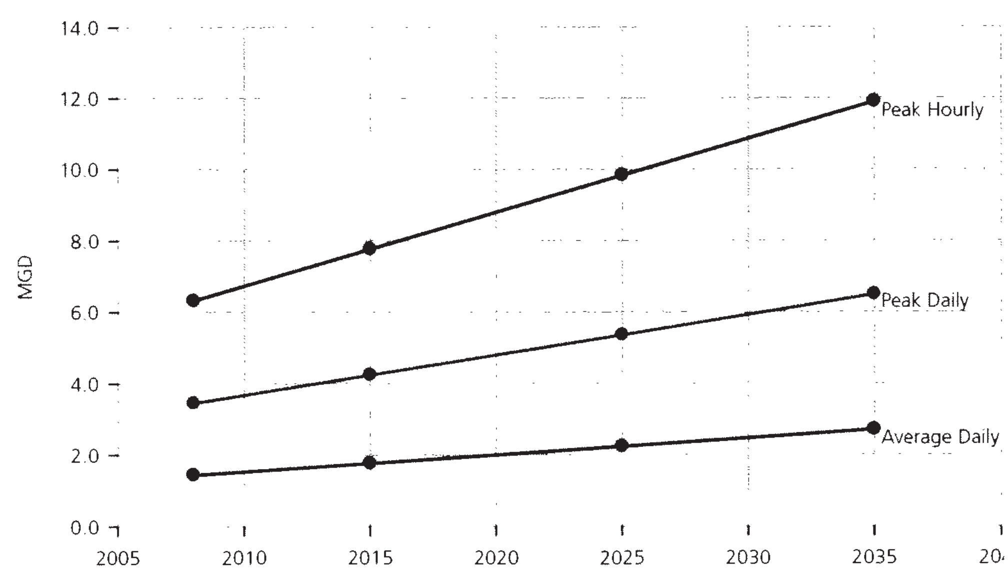


Figure 1: Projected water usage demands for both MUDs.

Daily Water Production

Daily production data for the four water treatment plants (WTP) and daily discharge for the one wastewater treatment plant (WWTP) over the past year were evaluated (Figure 2). The Walden plant is the newest WTP and has been operating only since January 2009. Each water plant includes a well, disinfection, and ground storage. The design capacity of each well is 1,200 gallons per minute (gpm) except for the Poe Street WTP, which is 1,000 gpm.

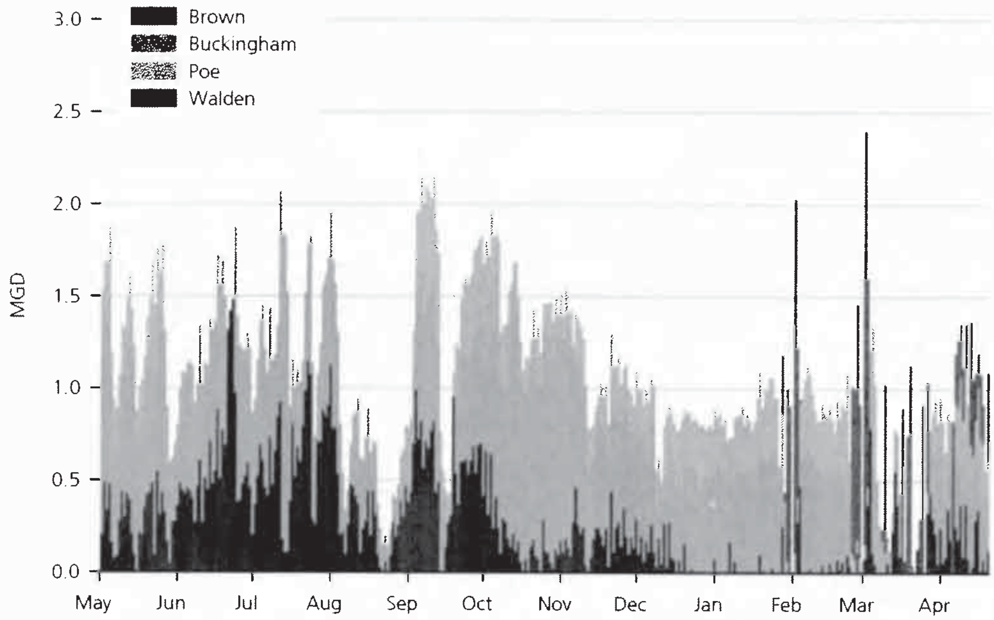


Figure 2: Daily WTP production data for May 1, 2008 to April 30, 2009.

For the period evaluated (May 1, 2008 to April 30, 2009)[2], the average daily production from all four water plants was 1.113 million gallons per day (mgd) (Table 2). The MUDs water distribution system is efficient, as between 91 and 97 percent of the total amount of water produced is billed to customers[3].

Table 2: Summary of daily water and wastewater production data for May 1, 2008 to April 30, 2009 (mgd).

	Water					Wastewater
	Brown	Buckingham	Poe	Walden	**Total**	**Total**
Annual Total*	98.395	204.971	68.988	24.895	**372.354**	**129.470**
Daily Average	0.270	0.563	0.190	0.251	**1.113**	**0.355**
Daily Minimum	0.0	0.0	0.0	0.0	**0.010**	**0.0**
Daily Maximum	1.481	1.714	0.736	2.247	**2.402**	**1.175**
Percent of Total (annual) Water Production	26.4%	55.1%	18.5%	6.7%	**100.0%**	**34.8%**
Percent of Average (daily) Water Production	24.3%	50.6%	17.0%	22.6%	**100.0%**	**31.9%**

* Data for 21 days during the year were missing.

2 Data were missing for a total of 21 days during this period.
3 Based on monthly data provided by the MUDs' engineers for the period of December 2007 to May 2009.

Daily Wastewater Discharge

The WWTP is presently permitted for a discharge capacity of up to 0.9 mgd, but the average daily wastewater discharge for the period evaluated was 0.355 mgd (see Table 2). Unlike with water production, which showed a strong seasonal signal (higher in the summer), the wastewater discharge is relatively constant (Figure 3). By volume, the WWTP discharges approximately 35 percent of the annual total WTP production and 32 percent of the daily average (Figure 4).

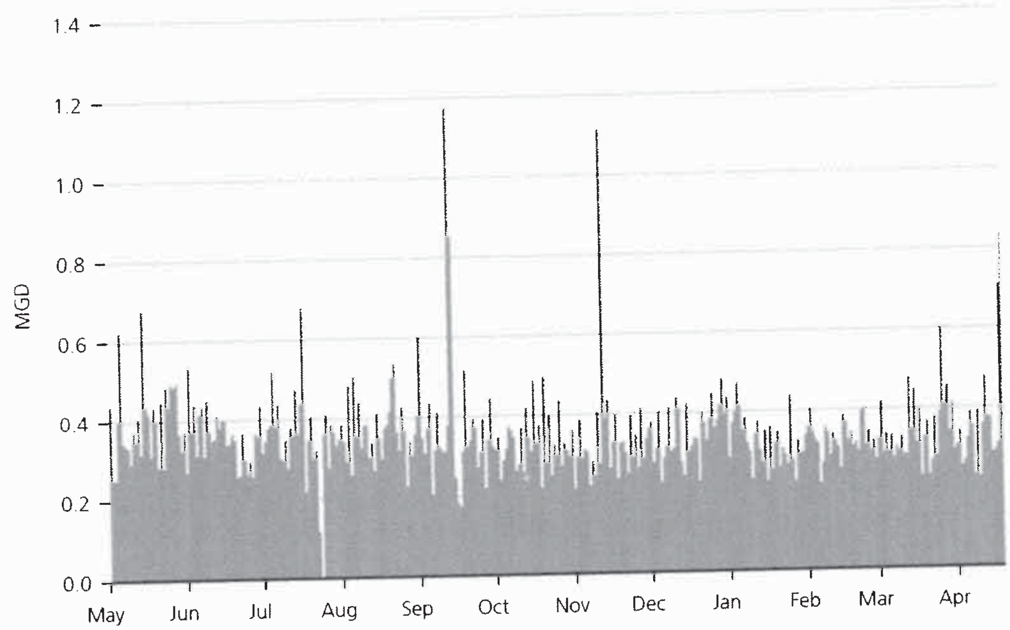


Figure 3: Daily WWTP discharge data for May 1, 2008 to April 30, 2009.

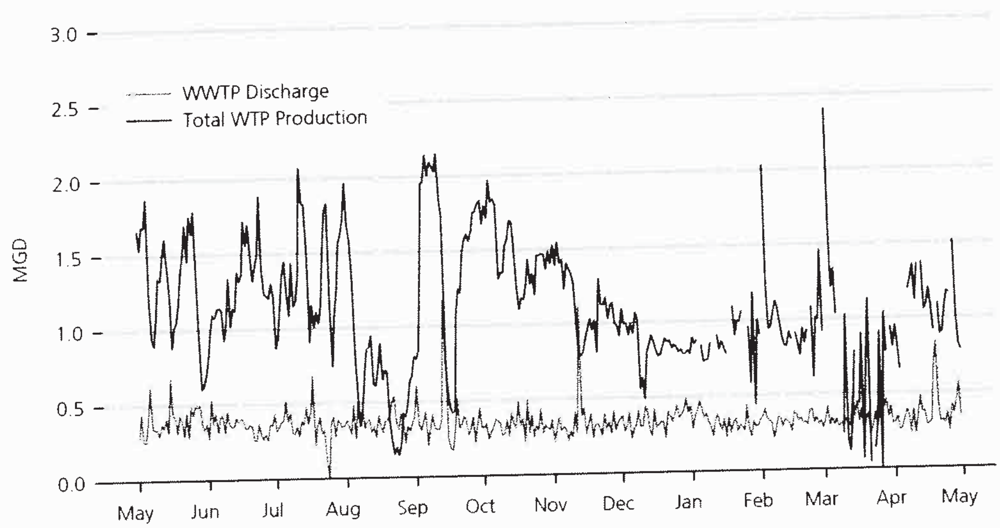


Figure 4: Comparison of total WTP production and WWTP discharge for May 1, 2008 to April 30, 2009.

Raw Water Quality

Raw water quality from Lake Conroe is very limited. The only data available included monthly and quarterly testing results for a limited period (October to December 2007) at the Intake Structure East Gate[4]. While insufficient for a firm treatment process design, this information provides some means of developing a conservative treatment process.

1.2 Proof of Concept Determination

Current Operations

Presently, the water and wastewater system for the MUDs operates as a single system, although individual facilities are owned by one or the other district. The four WTPs produce 100 percent of the potable water supply, all from groundwater (Figure 5). Of the total amount produced, 35 percent is returned to the WWTP, treated, and then discharged into Lake Conroe. The remaining 65 percent is lost to consumptive use by the customers.

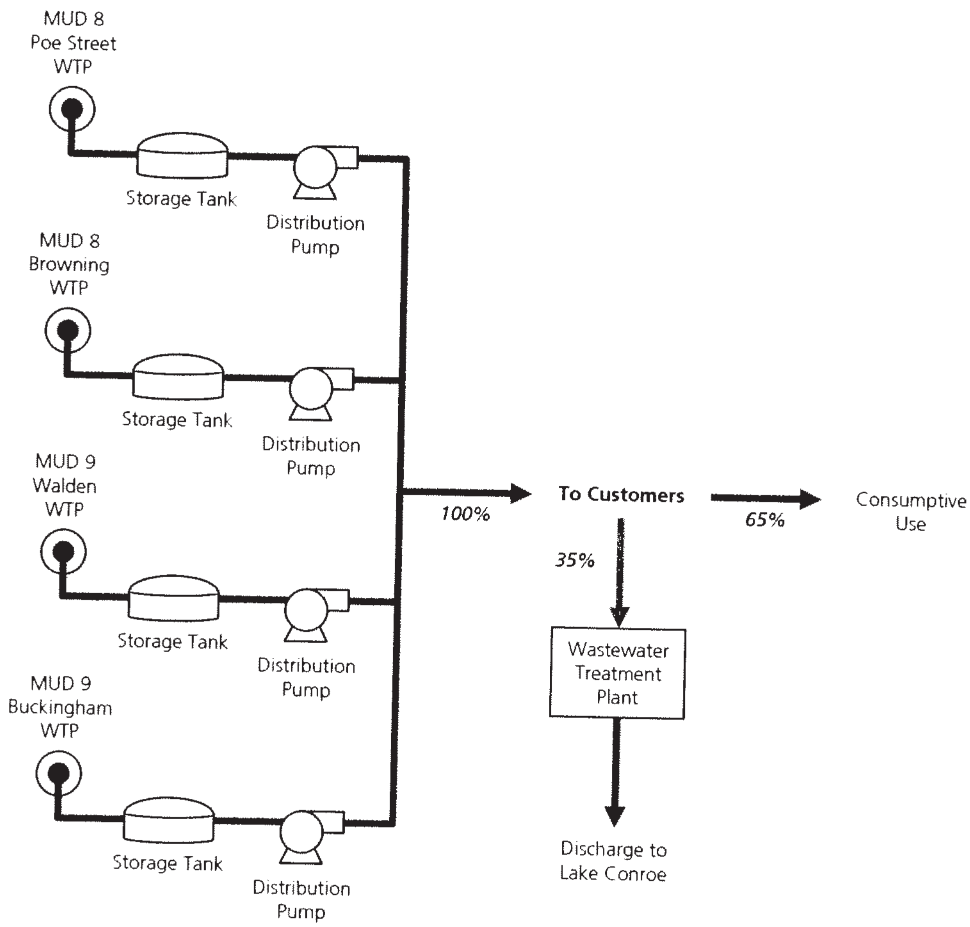


Figure 5: Diagram showing current system operation.

4 TCB/AECOM. 2008. Planning level study for Alternative surface water pipeline routing in Montgomery County for Lone Star Groundwater Conservation District and San Jacinto River Authority. May 2008.

Proposed Operations

Proposed Project Concept

The proposed project would involve developing a surface water treatment plant within the MUDs district boundaries. On a daily basis, the new WTP would divert and treat water from Lake Conroe in daily amounts equal to the discharge volume from the WWTP, less any evaporation losses (Figure 6). The raw water intake has not yet been sited, but would be located within the district boundaries at a distance from the wastewater treatment plant point of discharge that satisfies state regulatory requirements.

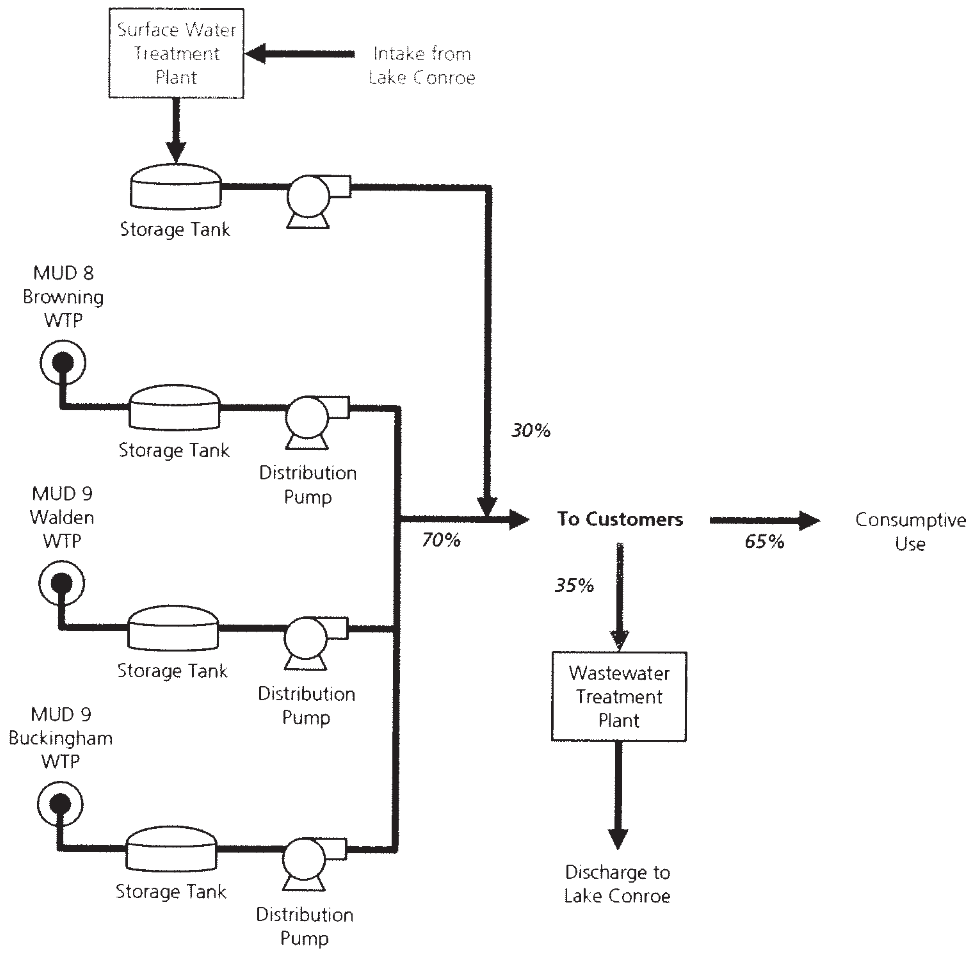


Figure 6: Diagram showing proposed system operation.

A basic spreadsheet model was constructed using daily data to quantify the effectiveness of this project concept. A MF treatment plant capacity of 0.5 mgd was selected as the initial project scale. On a daily basis, the amount of wastewater discharge available for diversion by the proposed MF treatment plant was determined. For this simulation, the daily actual total WTP production amount was used as the total daily water demand. On most days, this demand exceeded the WWTP discharge, so the full discharge amount could be diverted up to the design capacity of the MF treatment plant. However, on days when the demand was less than the WWTP discharge, or when the WWTP discharge exceeded the MF treatment plant capacity, some volume of WWTP discharge could not be diverted. The results of this simulation are summarized in Table 3.

Table 3: Summary of simulated water and wastewater system performance with a 0.50 mgd MF WTP using daily water and wastewater production data for May 1, 2008 to April 30, 2009 (mgd).

	WWTP Discharge Available for Diversion*	Simulated MF Plant Production	Simulated Groundwater Production	Simulated Total Production
Annual Total**	117.988	115.803	266.065	**381.868**
Daily Average	0.344	0.338	0.794	**1.110**
Daily Minimum	0.000	0.000	0.000	**0.000**
Daily Maximum	1.175	0.500	1.984	**2.402**
Percent of Total (annual) Water Production	31.69%	30.3%	69.7%	**100.0%**
Percent of Average (daily) Water Production	30.90%	29.8%	70.2%	**100.0%**

* Does not include any reduction for evaporation losses.

** Data for 21 days during the year were missing.

The proposed project concept would allow a portion of the total water production to be provided by surface discharge credits, resulting in a reduction by the same amount in groundwater pumping. The simulation shows that, if the proposed MF plant had been in operation for the past year, it could have accounted for 30.3 percent of the total (annual) and 29.8 percent of average (daily) of water production (Figure 7). Because water discharged into the lake from the WWTP would be diverted back from the lake within 24 hours, no net effect to water rights or reservoir storage capacity would occur.

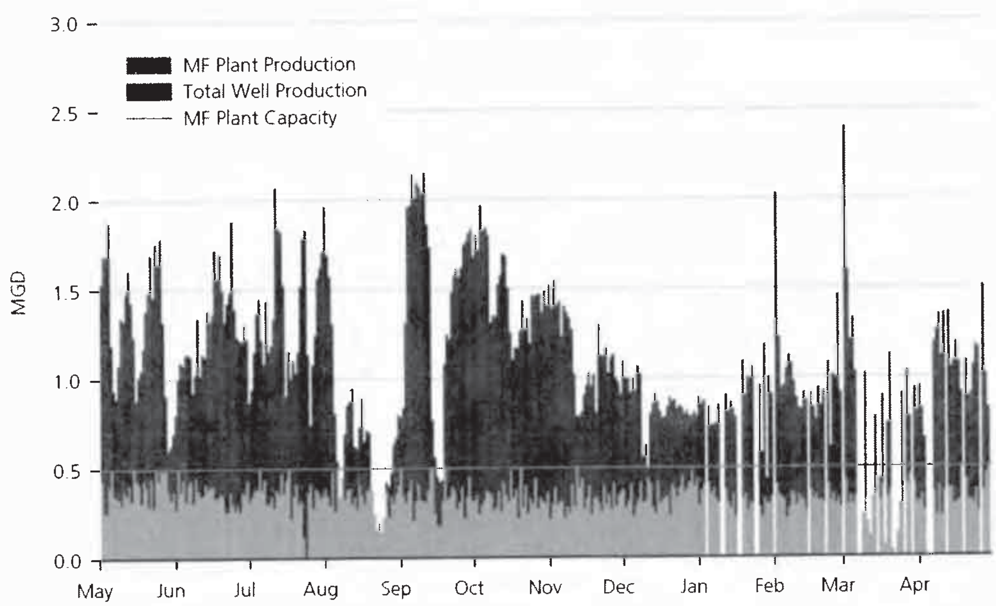


Figure 7: Simulated total water production for May 1, 2008 to April 30, 2009.

Treatment Process
Based on limted raw water quality data for Lake Conroe, the treatment method anticipated is rapid mix–flocculation–clarification–microfiltration (MF) (Figure 8). The initial MF treatment plant would be sized to produce 0.5 mgd, expandable to 1.0 mgd. The clarifier would be sized to accommodate 1.0 mgd at an overflow rate of 0.6 gallons per minute per square foot. The MF building would be large enough to contain 1.0 mgd, an electrical building, bathroom, lab, and perhaps a small office. In addition, two storage tanks would be constructed; one for the MF feed and one for the MF filtrate. The MF feed tank would allow storage due to the inconsistent feed flow rate due to scheduled membrane trains being off-line due to backwashing and other cleanings. The MF filtrate tank would be used to store treated water prior to pumping to the ground storage tank. Finally, a small lagoon would be included to contain the MF backwash. There is the potential that some of these facilities could be eliminated once more specific planning parameters and water quality data are known, but the present plan represents a conservative design approach.

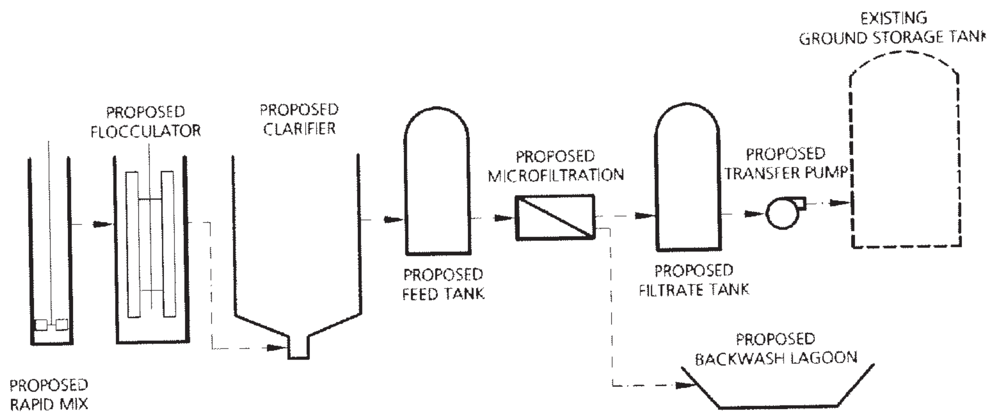


Figure 8: Conceptual process flow chart for the proposed MF plant.

As presently envisioned, the new WTP would be located at the Poe Street WTP where the MUDs own several adjacent parcels. A conceptual layout using the fewest parcels is provided in Figure 9.

2.2 Permitting Requirements

Implementing the proposed water credit project would require the MUDs obtain a bed and banks permit from the Texas Commission on Environmental Quality (TCEQ). As the applicant, the MUDs would seek authorization to divert and use its groundwater-based effluent return flow and any future groundwater based effluent return flow from the WWTP for municipal and industrial purposes within its service area, and to use Lake Conroe to convey return water to its diversion point.

As part of the bed and banks application, the applicants are required to demonstrate that the proposed project would not adversely affect water rights holders of water in Lake Conroe or their storage operations. This is demonstrated through a detailed accounting plan, which basically protects other water users and the owners of the water rights by ensuring that the appropriate amount of water is used, impounded, and released.

At the request of the MUDs, NRS prepared a draft Accounting Plan (Annex A) based on input from the MUDs' legal and engineering team. Any other permitting requirement for the proposed water credit project (such as TCEQ piloting and approval requirements for membrane-based water treatment facilities, or construction permits for intake installation) will be addressed as part of Task 2.

Figure 9: Conceptual layout of the proposed MF treatment plant.

Findings

Based on the engineering and permitting evaluation conducted in this Task 1 analysis, **no fatal flaws were identified for the proposed water credit project**. This conclusion is based on the following findings:

1. The proposed treatment system (microfiltration membrane process) would be adequate for the known water quality conditions in Lake Conroe.

2. There appears to be sufficient land presently controlled by the MUDs to accommodate a MF treatment plant with an initial capacity of 0.5 mgd, expandable to 1.0 mgd.

3. No permitting impediments exist to obtain state approval for the treatment process, although a raw water quality monitoring program and pilot-scale test may be required by TCEQ prior to approval.

4. An MF treatment plant with a capacity of 0.5 mgd could reduce the current amount of groundwater pumping by approximately 30 percent.

While no fatal flaws were identified, it should be noted that **the proposed water credit project may have one or more of the following potential limitations**:

1. Extended implementation schedule – if determined necessary by TCEQ, the permitting approval process for the proposed MF treatment plant may include a 12-month raw water quality monitoring program and a minimum 90-day pilot test. Together, including agency review and approval, these requirements could add 24 to 30 months of time prior to initiation of facility construction.

2. Does not address future increases in water demand – the proposed water credit project appears capable of satisfying the Lone Star GCD 30 percent reduction by 2015. However, as demands increase due to build-out activity, a new water supply will likely be required. The need for new water could be off-set by reductions in consumptive use (water conservation) or by introducing a new supply.

   If there was an opportunity to contract for additional surface water from Lake Conroe by contract, then the planning and design work for the MF treatment plant should anticipate this future expansion. There may be some advantage in negotiating a future water contract while seeking permission to implement the water credit project. From a bigger perspective, the regional plan under development by SJRA intends to meet the future demands of the MUDs with water from Lake Conroe, but through a large, regional treatment and distribution system. By allowing the MUDs to develop their own on-site treatment system for the same source water, some of the distribution costs of the regional project could be eliminated.

3. Project concept encompasses some risk while uncertainty remains in the final Lone Star GCD reduction requirement – while no fatal flaws were identified with the proposed water credit project as presently envisioned, a change in the reduction requirements or its application could impose conditions under which the project would not be feasible.

Annex A:
Proposed Accounting Plan

Introduction

This proposed Accounting Plan accompanies a Bed and Banks water rights application by Montgomery County Municipal Utility District No. 8 and Montgomery County Utility District No. 9, together referred to as "MUDs". The water system serving the MUDs is supplied by four groundwater wells located within MUDs' boundaries. This Plan describes the method by which the MUDs will account for discharges into and diversions from Lake Conroe, Texas.

In summary, the MUDs will:

1. Meter discharge into Lake Conroe from an existing Wastewater Treatment Plant WWTP) over a 24-hour period;

2. From the amount discharged, subtract a calculated evaporation value for that period to determine a daily diversion target;

3. Meter diversion from Lake Conroe to a new surface water treatment plant WTP) over the subsequent 24 hour period; and

4. Calculate the difference between the diversion target and actual diversion for that day, and adjust the next day's diversion target accordingly.

All measurements and calculations would be rounded to the nearest gallon. The result of this operation is that water discharged into the lake from the WWTP would be diverted back from the lake within 24 hours, and any differences between the target and actual diversions would be reconciled daily. There would be no net effect to water rights or reservoir storage capacity over a 24-hour period.

Explanation of Fields

The Accounting Plan would use six major fields (Table 4). All metered and calculated values would be integrated into the MUDs existing Supervisory Control and Data Acquisition (SCADA) system. The WTP would be designed with a set production capacity. Therefore, the total daily diversion target would be met by determining how long the facility would operate within the 24-hour period. Assigning this operating duration for each day could also be automated within the SCADA system or could be performed by an on-site operator.

Table 4: Summary of fields in the proposed Accounting Plan.

Field Name	A	B	C	D	E	F
	Date	Discharge	Carriage Losses	Diversion Target	Diversion	Difference
Units	daily	gallons	gallons	gallons	gallons	gallons
Source	assigned	metered	calculated	calculated	metered	calculated
Details	12:00am to 12:00am	-	**C = (X*Y*0.004329)*(B/Z)** where X represents the assigned daily evaporation rate in inches, Y represents the surface area of Lake Conroe at conservation pool elevation (126,192,971,520 square inches)[5], 0.004239 equals the factor to convert cubic inches to gallons; and Z represents the volume of Lake Conroe at conservation pool elevation (135,628,490,360 gallons)[6].	**$D = B–C+F_1$** where 1 indicates the previous day's value	-	**$F_2 = D–E$** where 2 indicates the current day's value

Date

Data would be reported daily on a 24-hour basis from midnight to midnight.

Discharge

WWTP discharge data would be metered.

Carriage Losses

Carriage losses between the point of discharge and the point of diversion would only include evaporation. The proposed Accounting Plan would estimate daily evaporation based on the proportional share that the discharge volume comprises of the reservoir storage capacity of Lake Conroe at conservation pool.

The Texas Water Development Board[7] has calculated monthly lake surface evaporation for Texas over a 53-year period from 1954 to 2007. Data used included monthly pan evaporation and precipitation data obtain from 1) TWDB and NWS evaporation stations; 2) Hydrosphere NCDC (National Climatic Data Center), Summary of the Day Compact Disc; 3) NCDC Climatological data (monthly or annual) for surrounding states (Louisiana, Arkansas, Oklahoma, and New Mexico); and 4) other internet data sources. For use in this Accounting Plan, the monthly average evaporation value for Lake Conroe (Quad 712) was divided by the average number of days in that month to obtain a daily evaporation rate (Table 5).

5 Texas Water Development Board. 2003. Volumetric Survey of Lake Conroe. Prepared for San Jacinto River Authority; March 10, 2003. Texas Water Development Board, Austin, Texas.

6 *Ibid.*

7 Texas Water Development Board. 2009. Evaporation and Precipitation Data for Texas. Acquired online at http://midgewater.twdb.state.tx.us/cgi-in/Evaporation/parseevap.cgi?quad=712&options=ET&submit=SUBMIT.

Table 5: Monthly evaporation rates for Lake Conroe, Texas.

Quad	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
712	1954	1.87	3.45	4.00	4.21	4.80	6.80	6.56	6.56	6.39	5.13	3.34	2.82	**55.94**
712	1955	2.44	2.14	3.93	4.92	5.31	5.89	5.85	5.08	4.64	5.60	3.92	2.70	**52.42**
712	1956	2.58	2.98	3.84	4.63	5.70	5.96	8.28	7.41	6.27	4.83	3.05	2.71	**58.23**
712	1957	1.52	1.96	3.52	3.66	4.72	4.96	6.45	5.96	4.16	3.31	2.59	2.07	**44.87**
712	1958	1.76	2.13	2.98	3.70	4.27	6.01	5.45	6.03	3.07	2.73	2.06	1.46	**41.64**
712	1959	1.41	1.51	3.66	3.54	4.62	5.62	5.25	4.20	3.99	3.50	2.28	1.69	**41.26**
712	1960	1.67	1.93	2.68	3.98	5.22	6.30	5.43	3.42	4.14	2.76	2.04	1.37	**40.94**
712	1961	1.56	2.14	3.23	4.35	5.09	4.94	4.72	5.06	4.20	4.01	2.29	1.84	**43.41**
712	1962	1.77	2.62	3.49	4.06	5.12	4.57	6.03	6.53	4.11	4.34	2.81	1.90	**47.34**
712	1963	1.35	2.23	3.74	4.80	5.37	5.74	5.75	6.07	4.43	4.03	2.71	1.77	**48.00**
712	1964	1.79	2.36	3.20	3.93	4.60	5.86	5.82	5.55	4.25	4.38	2.69	1.96	**46.38**
712	1965	2.35	2.13	3.28	3.92	3.95	5.39	6.16	5.17	4.81	3.51	2.20	1.36	**44.23**
712	1966	1.37	2.01	3.69	3.93	3.75	6.20	6.59	5.05	4.52	3.77	3.10	1.96	**45.95**
712	1967	1.99	2.52	4.28	3.99	4.67	6.14	6.11	6.14	4.39	4.51	2.68	1.77	**49.19**
712	1968	1.74	2.06	2.94	3.31	4.49	4.23	5.38	6.03	4.26	3.75	2.75	2.01	**42.96**
712	1969	1.70	1.22	3.17	4.31	3.88	5.21	6.73	6.01	4.79	4.46	2.73	1.87	**46.07**
712	1970	1.32	2.39	2.95	3.87	4.74	5.98	6.41	6.73	4.14	3.50	2.95	2.64	**47.61**
712	1971	2.06	2.86	3.82	5.35	4.57	6.39	7.92	5.20	4.03	3.88	2.84	1.42	**50.36**
712	1972	2.00	2.37	3.81	4.52	4.59	5.63	5.35	4.93	4.03	3.55	2.14	1.32	**44.24**
712	1973	1.49	1.61	3.11	3.07	4.81	4.49	6.14	4.80	3.88	3.16	3.11	2.40	**42.07**
712	1974	1.59	2.76	3.50	4.64	4.82	5.32	6.64	5.09	3.47	3.56	2.26	2.01	**45.67**
712	1975	2.18	2.01	3.11	3.61	3.89	4.93	4.99	4.61	4.27	4.21	3.11	2.06	**42.99**
712	1976	2.36	2.99	3.38	3.93	4.54	5.43	4.37	5.85	4.33	3.51	2.11	1.95	**44.75**
712	1977	1.87	2.78	3.42	4.47	5.31	5.88	6.39	5.21	4.94	4.06	2.99	2.51	**49.82**
712	1978	1.58	1.81	3.63	4.41	5.12	5.62	5.91	6.24	4.11	4.75	2.62	2.00	**47.79**
712	1979	2.27	1.81	3.85	3.92	4.64	5.44	5.25	5.14	4.75	4.44	3.02	2.17	**46.71**
712	1980	1.69	2.43	3.46	4.80	4.91	6.85	8.02	6.95	5.29	4.38	2.71	2.04	**53.52**
712	1981	2.51	2.26	3.66	4.07	4.96	5.64	5.71	6.46	5.25	3.50	3.19	2.37	**49.59**
712	1982	1.92	2.14	3.25	3.91	4.58	6.17	6.89	6.74	5.69	4.31	3.31	2.60	**51.52**
712	1983	2.56	2.45	3.95	4.70	5.32	5.46	6.25	5.46	4.78	3.98	3.25	2.44	**50.62**
712	1984	1.98	2.97	3.99	5.28	5.86	5.93	6.44	6.10	5.03	4.86	3.63	2.91	**54.97**
712	1985	2.34	2.86	4.25	4.54	5.45	6.62	5.87	6.87	5.35	4.12	2.61	1.91	**52.77**
712	1986	2.63	2.97	4.40	4.62	5.46	5.24	6.98	6.05	4.31	3.62	1.96	1.54	**49.76**
712	1987	2.73	2.00	4.06	5.45	4.17	5.60	5.86	6.77	4.74	4.25	3.08	1.57	**50.27**
712	1988	1.97	2.22	3.55	4.62	5.73	5.86	6.30	6.26	5.38	4.48	2.88	1.94	**51.19**
712	1989	1.93	2.10	3.39	4.19	4.82	5.06	5.63	5.37	5.20	4.38	3.09	2.36	**49.10**
712	1990	2.02	2.30	3.10	3.73	4.83	6.99	6.08	6.81	4.76	4.14	2.59	1.63	**50.65**
712	1991	2.57	2.31	3.65	4.06	4.31	6.16	6.43	6.49	6.04	5.31	4.14	5.12	**56.60**
712	1992	3.55	2.93	3.35	4.10	3.85	5.04	5.30	5.00	4.53	3.68	3.11	1.71	**46.16**
712	1993	2.65	2.15	2.65	3.61	5.37	6.92	6.66	7.10	5.53	4.19	2.45	3.23	**52.49**
712	1994	2.87	3.04	3.37	3.80	5.07	6.11	7.24	5.77	6.11	6.37	3.00	4.83	**57.57**
712	1995	2.56	1.97	3.60	4.32	4.95	6.55	6.41	5.53	4.75	4.34	2.73	2.17	**49.90**
712	1996	2.17	2.75	3.60	5.09	5.63	5.72	6.70	5.62	4.79	4.29	2.55	3.01	**51.93**
712	1997	2.85	2.05	2.97	5.22	4.75	6.03	7.25	6.79	5.20	4.52	3.30	2.28	**53.22**
712	1998	1.95	2.60	4.22	5.54	5.03	7.28	7.97	6.68	4.97	3.93	2.30	2.05	**54.52**
712	1999	3.69	2.61	3.52	4.91	6.42	6.49	6.31	7.41	6.14	4.16	3.01	2.57	**57.25**
712	2000	2.99	2.36	3.61	4.91	6.36	5.85	7.60	7.10	6.58	3.48	4.80	3.86	**59.50**
712	2001	1.04	1.57	3.14	3.61	4.66	4.15	5.07	5.25	4.53	3.64	3.09	2.25	**42.00**
712	2002	1.92	2.30	3.24	5.14	5.62	5.76	5.10	5.17	5.23	3.07	2.44	2.23	**47.25**
712	2003	2.13	2.07	3.20	4.09	4.88	6.56	5.89	5.83	4.44	4.34	3.67	3.07	**50.17**
712	2004	3.14	2.68	3.73	4.19	5.01	5.20	6.02	6.93	5.43	4.14	3.38	3.26	**53.13**
712	2005	2.44	3.26	3.59	5.14	5.56	6.55	7.00	5.99	5.51	5.12	4.07	2.63	**56.87**
712	2006	3.42	3.05	3.94	5.25	5.85	6.75	5.62	6.89	5.30	4.37	3.50	2.65	**56.60**
712	2007	3.11	2.33	4.00	3.98	5.61	5.24	5.52	5.92	4.98	4.93	4.10	2.57	**52.29**
Average Monthly		**2.17**	**2.36**	**3.53**	**4.33**	**4.96**	**5.79**	**6.19**	**5.91**	**4.82**	**4.13**	**2.93**	**2.31**	49.49
Minimum		1.04	1.22	2.65	3.07	3.75	4.15	4.37	3.42	3.07	2.73	1.96	1.32	40.94
Maximum		3.69	3.45	4.40	5.54	6.42	7.28	8.28	7.41	6.58	6.37	4.80	5.12	59.50
Ave. Days in Month		31	28.25	31	30	31	30	31	31	30	31	30	31	**365.25**
Calculated Daily		**0.0698**	**0.0836**	**0.1139**	**0.1444**	**0.1599**	**0.1930**	**0.1996**	**0.1908**	**0.1606**	**0.1333**	**0.0977**	**0.0744**	

Source: Texas Water Development Board 2009.

A simulation of carriage losses was conducted using the calculated monthly evaporation values applied to the daily data for the past year. Based on this assessment, the MUDs' portion of daily evaporation losses would account for an average of 0.05 percent of the average daily WWTP discharge, or about 195 gallons per day (Table 6).

Table 6: Summary of simulated daily carriage losses due to evaporation by month using daily wastewater production data for May 1, 2008 to April 30, 2009.

		Calculated Evaporation			
	Average Daily Discharge (gallons)	Total Daily Evaporation on Lake Conroe (gallons)	MUDs' Share of Daily Evaporation	Daily Carriage Loss (gallons)	Percent of Average Daily Discharge
Jan	322,600	38,130,998	0.000238%	**91**	0.03%
Feb	327,400	45,669,792	0.000241%	**110**	0.03%
Mar	347,900	62,222,360	0.000257%	**160**	0.05%
Apr	374,800	78,884,186	0.000276%	**218**	0.06%
May	391,300	87,351,671	0.000289%	**252**	0.06%
Jun	358,600	105,433,849	0.000264%	**279**	0.08%
Jul	351,100	109,039,359	0.000259%	**282**	0.08%
Aug	369,000	104,232,013	0.000272%	**284**	0.08%
Sep	384,200	87,734,073	0.000283%	**249**	0.06%
Oct	331,900	72,820,374	0.000245%	**178**	0.05%
Nov	343,400	53,372,472	0.000253%	**135**	0.04%
Dec	353,000	40,643,929	0.000260%	**106**	0.03%
Average	354,600	73,794,590	0.000261%	**195**	0.05%

Diversion Target

The daily targeted diversion volume from the MF treatment plant would be calculated by adding the previous day's discharge volume less the carriage loss. To this amount would be added any difference in actual and targeted diversion from the previous day.

Diversion

MF treatment plant diversion data would be metered.

Difference

On a daily basis, the difference in actual diversion and targeted diversion would be calculated.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: NHCRWA Wastewater Reclamation for Industrial Use and Municipal and Commercial Irrigation Use

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Wastewater reclamation for industrial reuse and municipal and commercial irrigation reuse from up to 163 municipal utility districts or similar entities within the North Harris County Regional Water Authority (NHCRWA) service area. Under this strategy, entities within the NHCRWA service area which own wastewater may elect individually, collectively or in combination with the NHCRWA (under an agreement authorizing the NHCRWA's participation) to submit a water right permit application for those respective wastewater flows.

SUPPLY QUANTITY: Up to 61,000-, 87,000-, 103,000-, 115,000-, 121,000-, 124,000-, and 126,000-acre-feet per year for Years 2000, 2010, 2020, 2030, 2040, 2050, and 2060, respectively. The NHCRWA, and/or other districts in the Authority service area, may also request permits for any future flows from WWTP facility expansions or additions.

SUPPLY SOURCE: Effluent from up to 163 municipal utility districts or similar entities which own and operate WWTPs. Total effluent volume is unknown, however, only a percentage of total effluent volume will be available for reclamation, based on permits.

TOTAL STRATEGY COST:	$66,778,700 for allocated 16,300 acre-feet (Costs rounded to nearest $100)
UNIT WATER COST:	$702 per ac-ft allocated

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The purpose of this analysis is to address the potential use of reclaimed wastewater to meet projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to supplement existing and future water supplies that serve industrial demands as well as municipal and commercial irrigation demands within NHCRWA's service area.

ANALYSIS

The NHCRWA, and/or other districts within the Authority service area, could submit water right permit applications for return flows from approximately 163 WWTPs from within the NHCRWA service area. These WWTPs discharge to tributaries of the San Jacinto River and Lake Houston. The applicant(s) can use bed and banks permits to transmit the water to future diversion locations yet to be identified. Figure 1 provides a graphical representation of the NHCRWA service area, WWTP discharge points, and waterways which could potentially be used for the transport of the return flows to diversion locations.

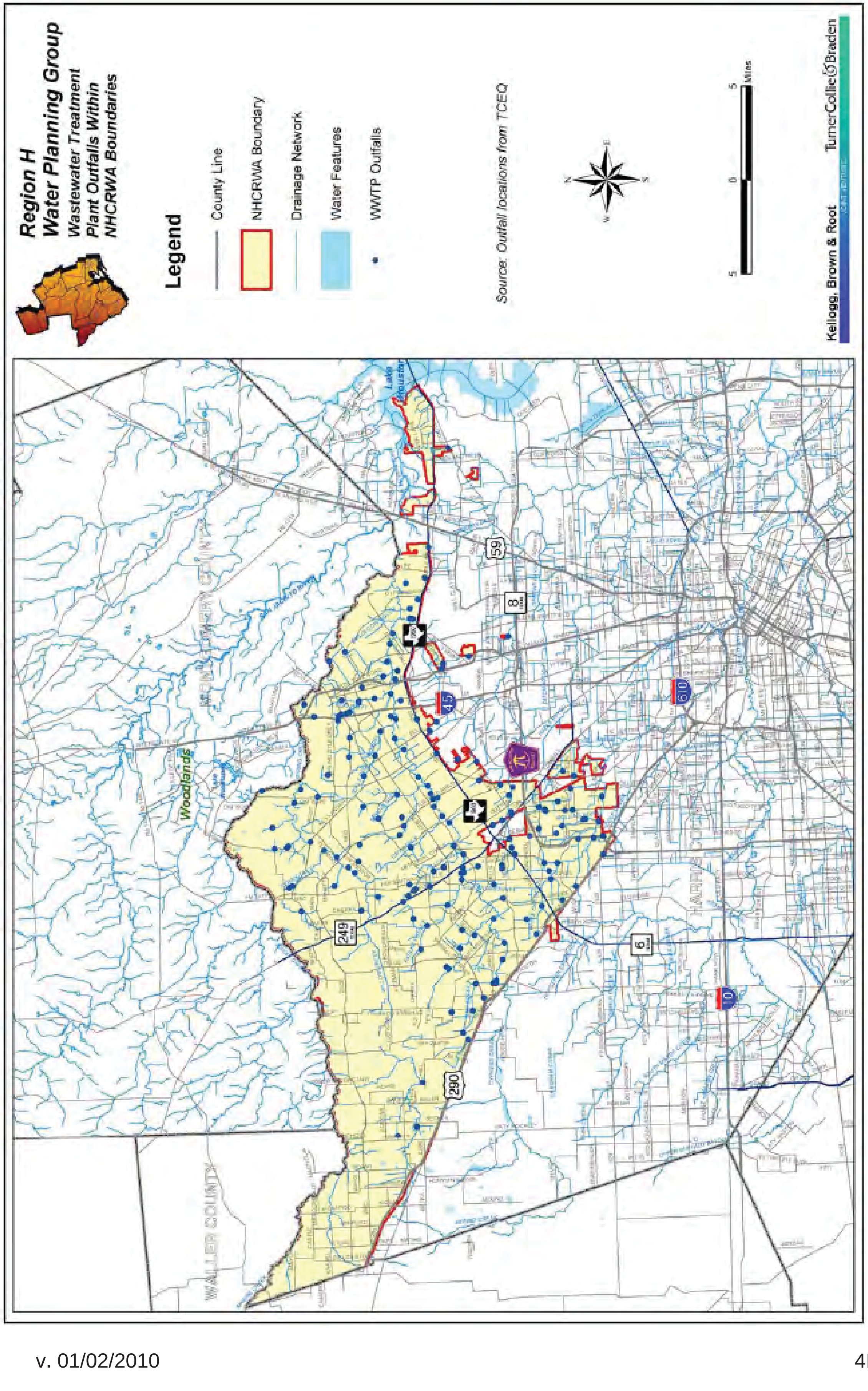
The amount of estimated future flows from the approximately 163 WWTPs is estimated at 61,000-, 87,000-, 103,000-, 115,000-, 121,000-, 124,000-, and 126,000-acre-feet per year for Years 2000, 2010, 2020, 2030, 2040, 2050, and 2060, respectively. These values were estimated using the 2011 Regional Water Plan projected water demands and applying a 75 percent factor (referenced in the *2003 Groundwater Reduction Plan* (GRP) prepared by NHCRWA consultants) to determine the quantity of water that could be expected as return flows through the WWTPs for the 60 year planning period. Future plant expansions and/or additions could increase the amount of water available for reuse downstream.

WATER USER GROUP APPLICATION

This strategy would help to meet the growing industrial demands as well as municipal and commercial irrigation demands of the region in which the NHCRWA serves.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns will be addressed during the TCEQ permitting process.


Region H
Water Planning Group
Wastewater Treatment
Plant Outfalls Within
NHCRWA Boundaries
Legend
County Line
NHCRWA Boundary
Drainage Network
Water Features
WWTP Outfalls
Source: Outfall locations from TCEQ
5
0
5
Miles
Kellogg, Brown & Root
TurnerCollie&Braden
Woodlands
Lake Houston
WALLER COUNTY
MONTGOMERY COUNTY
HARRIS COUNTY
249
290
59
8
45
610
6
10

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Wastewater Reclamation for Manufacturing Use

DATE: July 22, 2010

SUMMARY

STRATEGY DESCRIPTION: Wastewater reclamation for industrial process water along the Houston Ship Channel using reclaimed wastewater as a source from three City of Houston wastewater treatment plants.

SUPPLY QUANTITY: 67,200 ac-ft per year (60 mgd)

SUPPLY SOURCE: Up to 92,960 ac-ft per year (83 MGD) of effluent from three Houston wastewater treatment plants – 69th Street, Sims North, and Sims South.

TOTAL STRATEGY COST: $332,051,800 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $893 per acre-foot

Water Management Strategy Analysis Description

Introduction

The purpose of this analysis is to determine the potential use of reclaimed wastewater to address projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to replace existing surface water supplies that serve industrial demands for process and boiler feed waters. Under this strategy, municipal wastewater currently discharged to Buffalo Bayou will receive further treatment and will be offered as a high quality water supply to industries. Reclaimed wastewater will be superior in quality to the raw water currently supplied, thus allowing industrial consumers to significantly reduce or eliminate their onsite water treatment costs. This strategy is applied within the industrial corridor of State Highway 225 and the Houston Ship Channel (San Jacinto Basin). The raw water saved would then be available to meet other demands in Harris County.

Effluent from three of the City's wastewater treatment plants—Sims North, Sims South and 69th Street—will be used. Secondary effluent will be pumped to an Integrated Membrane Treatment Facility (IMTF). After treatment, the reclaimed water will be piped to the industrial users along the south side of the Houston Ship Channel corridor (see Figures 1 and 2).

Figure 1: Reuse Process

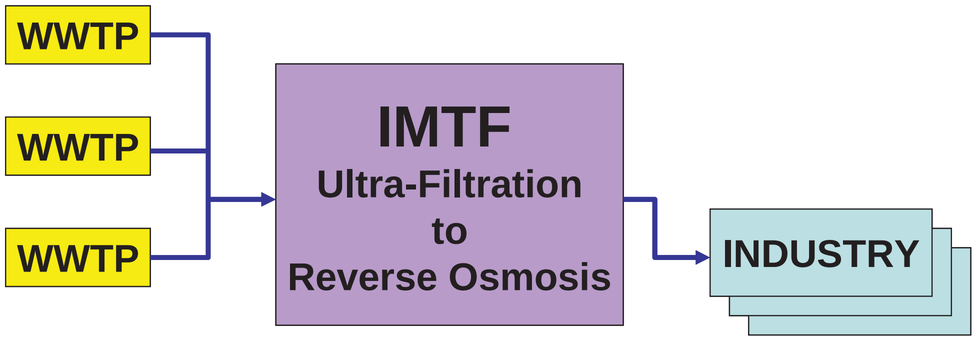
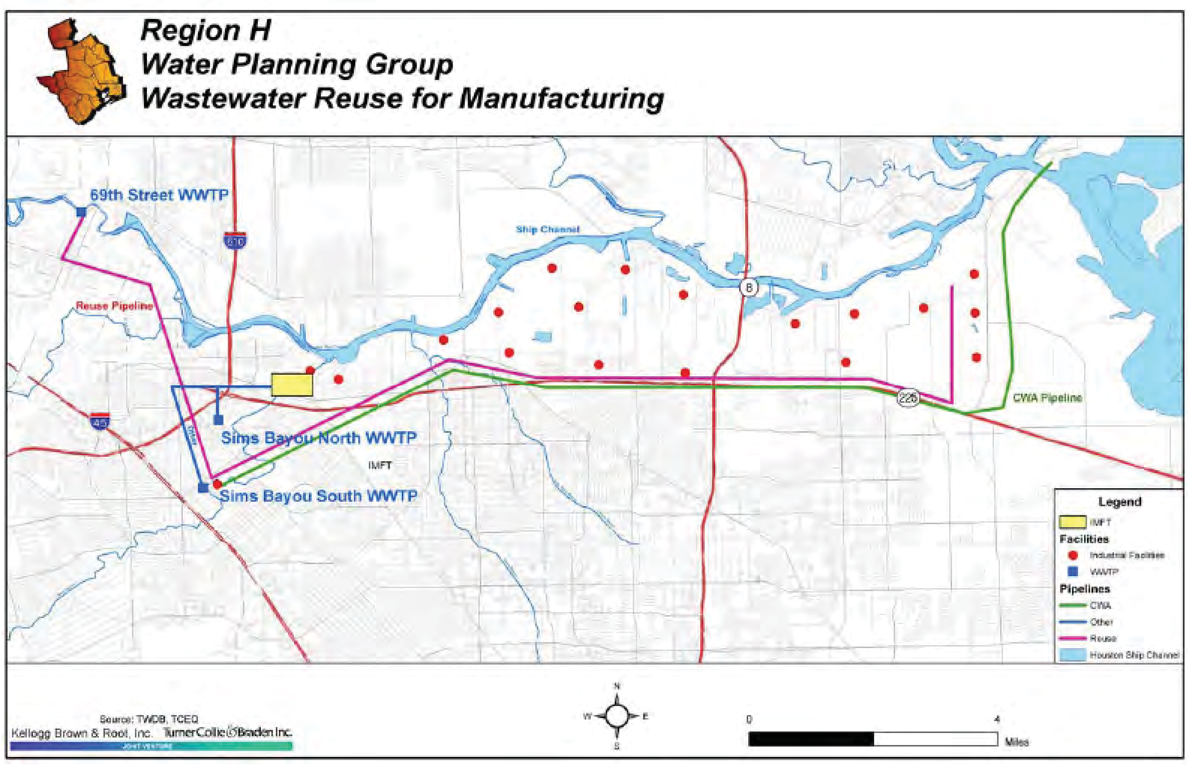


Figure 2: Reuse Location and Industrial Facilities



Water User Group Application

This strategy will address projected municipal and manufacturing shortages within Harris County. This shortage begins in year 2010 and ranges to approximately 403,000 acre-feet by year 2060.

This strategy has an interesting cost dynamic. The industries will participate in this strategy only if it can be proven that their specific total water cost can be reduced. Reclamation saves an equivalent quantity of existing City of Houston Trinity River water supplies. The exact cost benefit of this strategy can only be determined through negotiation of firm supply contracts with the industry customers.

Environmental Impact

Environmental Impacts – Effluent currently being discharged to Buffalo Bayou, Sims Bayou, and the Houston Ship Channel would be diverted to the new IMTF. A discharge of brine concentrate from the IMTF into the Houston Ship Channel could affect water quality, although the proposed discharge would be into the dredged channel below the saline elevation. Reclaiming effluent will reduce the impacts of the current WWTP discharges. However, less effluent will be discharged into the receiving stream. Minimal impact to the terrestrial habitats and terrestrial organisms adjacent to these bayous is expected as a result of the reduction of wastewater treatment plant discharges.

Impacts to Water Resources of the State – Current levels of wastewater discharge by industries into the Houston Ship Channel would remain unchanged. There are no water rights on the Houston Ship Channel that would be negatively impacted by this strategy. This strategy will treat 83 mgd of effluent to produce 60 mgd of delivered high-quality water (the other 23 mgd being brine discharge). This will offset an existing raw water demand which is currently met from other City of Houston surface sources in the Trinity and San Jacinto basins.

Impacts to Agriculture and Other Natural Resources of the State – Proposed reclamation would not impact agriculture since there are no agriculture surface water users downstream of the proposed facility.

Issues and Considerations

Impacts to Manufacturing—Substitution of reclaimed wastewater will increase the industries' cost of water. However, the reclaimed water will save the industries money since reclaimed water will require less treatment (and in many cases no additional treatment) after it is delivered to the industrial consumers. It appears that the use of reclaimed municipal wastewater may be an economical alternative to current supplies.

Cost estimate—Project costs of this strategy, both capital and O&M, have been taken from the cost estimates developed for the ongoing Wastewater Reclamation and Reuse Feasibility Study funded by the City of Houston, the Gulf Coast Waste Disposal Authority and the Texas Water Development Board. The WWRRFS work used recent comparable contract unit prices to estimate construction costs for all facilities except the wastewater reclamation plant. Construction and O&M costs for the 2006 plant were developed using the WTCost software package provided by the US Bureau of Reclamation. Costs are updated to September 2008 for the 2011 RWP.

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 215,532,966	$ 215,532,966
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 73,221,996	$ 73,221,996
3	LAND & EASEMENTS	1	LS	$ 6,746,500	$ 6,746,500
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 524,000	$ 524,000
5	INTEREST DURING CONSTRUCTION	1	LS	$36,026,299	$ 36,026,299
	PROJECT COST				$ 332,051,761

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ -	$28,949,786
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ -	$ 24,570,941
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ -	$ 1,671,887
4	REBATE OF CWA DEBT SERVICE COSTS	$ -	$ -	$ -	$ -	$ -	$ 4,818,000
	TOTAL ANNUAL COST	$ -	$ -	$ -	$ -	$ -	$ 60,010,614

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 19,133,975	$ 19,133,975
2a	PIPELINES	1	LS	$ 28,721,488	$ 28,721,488
2b	PIPELINE CROSSINGS	1	LS	$ 15,569,350	$ 15,569,350
3	WATER TREATMENT PLANTS	1	LS		$ -
4	WATER STORAGE TANKS	1	LS		$ -
5	OFF-CHANNEL RESERVOIRS	1	LS		$ -
6	WELL FIELDS	1	LS		$ -
7	DAMS & RESERVOIRS	1	LS		$ -
8	RELOCATIONS	1	LS		$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1	LS		$ -
10	STILLING BASINS	1	LS		$ -
11	WASTEWATER RECLAMATION PLANTS	1	LS	$ 152,108,153	$ 152,108,153
12	OTHER ITEMS	1	LS		$ -
	PROJECT COST				$ 215,532,966

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

Formula Basis for Estimating
WWRRFS Estimate & WT Cost (Bureau of Reclamation Softw are)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.025	%	$ 19,133,975	$ 478,349
2a	PIPELINES	0.010	%	$ 28,721,488	$ 287,215
2b	PIPELINE CROSSINGS	0.010	%	$ 15,569,350	$ 155,694
3	WATER TREATMENT PLANTS (see page before previous)	1	LS		$ -
4	WATER STORAGE TANKS	0.010	%		$ -
5	OFF-CHANNEL RESERVOIRS	0.010	%		$ -
6	WELL FIELDS	0.010	%		$ -
7	DAMS & RESERVOIRS	0.015	%		$ -
8	RELOCATIONS	0.010	%		$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%		$ -
10	STILLING BASINS	0.010	%		$ -
11	WASTEWATER RECLAMATION PLANTS (see previous page)	1	LS	$ 23,649,683	$ 23,649,683
12	OTHER ITEMS	0.010	%		$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 24,570,941**

PUMP STATIONS
CONSTRUCTION COSTS

Formula Basis for Estimating (same formula as Table uses)
WWRRFS Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Stations	1	LS	$ 19,133,975	$ 19,133,975
2	Pump Station #1 added Intake Structure				$ -
3	Pump Station #1 added Standby Pow er				$ -
	PUMP STATIONS TOTAL COST				**$ 19,133,975**

PIPELINES
CONSTRUCTION COSTS

Table Basis for Estimating
WWRRFS Cost Estimate

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Urban Pipeline	Various	1	LS	$ 28,721,488	$ 28,721,488
2	Rural Pipeline					$ -
	PIPELINES TOTAL COST					**$ 28,721,488**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

PIPELINE CROSSINGS
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (not used)
WWRRFS Cost Estimate

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
PIPELINE CROSSING COST SUMMARY						
1	Pipeline Crossing	Various	1	LS	$ 15,569,350	$ 15,569,350
	PIPELINE CROSSINGS TOTAL COST					**$ 15,569,350**

WATER TREATMENT PLANTS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT COST SUMMARY					
1	Groundwater Chlorination Treatment Plant	100	MGD	$ 19,834,000	$ 19,834,000
2	Direct Filtration Treatment Plant	100	MGD	$ 147,334,000	$ 147,334,000
3	Conventional Filtration Treatment Plant	100	MGD	$ 184,168,000	$ 184,168,000
	WATER TREATMENTS PLANT TOTAL COST				**$ 351,336,000**

WATER STORAGE TANKS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT COST SUMMARY					
1	Water Storage Tank	10	MG	$ 4,555,000	$ 4,555,000
	WATER STORAGE TANKS TOTAL COST				**$ 4,555,000**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

OFF-CHANNEL STORAGE RESERVOIRS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OFF-CHANNEL STORAGE RESERVOIR COST SUMMARY					
1	Off-Channel Storage Reservoir	10,000	AC-FT	$ 9,540,000	$ 9,540,000
	OFF-CHANNEL STORAGE RESERVOIRS TOTAL COST				**$ 9,540,000**

WELL FIELDS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	WELL DEPTH	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(FT)	(GPM)			
WELL COST SUMMARY						
1	Public - static W.S. 0-200 ft below land	1,000	700	GPM	$ 504,400	$ 504,400
2	Public - static W.S. 200-300 ft below land	1,000	400	GPM	$ 478,200	$ 478,200
3	Public - static W.S. 300-400 ft below land	1,000	700	GPM	$ 524,000	$ 524,000
4	Public - static W.S. 400-500 ft below land	1,000	1,000	GPM	$ 845,000	$ 845,000
5	Agricultural - static W.S. 0-200 ft below lan	1,000	700	GPM	$ 277,420	$ 277,420
6	Agricultural - static W.S. 200-300 ft below l	1,000	400	GPM	$ 263,010	$ 263,010
7	Agricultural - static W.S. 300-400 ft below l	1,000	700	GPM	$ 288,200	$ 288,200
8	Agricultural - static W.S. 400-500 ft below l	1,000	1,000	GPM	$ 464,750	$ 464,750
	WELLS TOTAL COST					**$ 3,644,980**

STILLING BASINS
CONSTRUCTION COSTS

Formula Basis for Estimating
Cost = 2,800 *1.31* (Discharge in CFS)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
STILLING BASIN COST SUMMARY					
1	Stilling Basin	20	CFS	$ 3,668	$ 73,360
	STILLING BASIN TOTAL COST				**$ 73,360**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

WASTEWATER RECLAMATION PLANTS
CONSTRUCTION COSTS

Table Basis for Estimating
WT Cost (BuRec Softw are)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WASTEWATER RECLAMATION PLANT COST SUMMARY					
1	Wastew ater Reclamation Plant	1	LS	$ 152,108,153	$ 152,108,153
	WASTEWATER RECLAMATION PLANT TOTAL COST				**$ 152,108,153**

WATER TREATMENT PLANTS
OPERATIONS & MAINTENANCE (O&M) COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT ANNUAL O&M SUMMARY					
1	Groundw ater Chlorination Treatment Plant	100	MGD	$ 2,380,000	$ 2,380,000
2	Direct Filtration Treatment Plant	100	MGD	$ 17,680,000	$ 17,680,000
3	Conventional Filtration Treatment Plant	100	MGD	$ 22,100,000	$ 22,100,000
	WATER TREATMENT PLANT ANNUAL O&M TOTAL COST				**$ 42,160,000**

WASTEWATER RECLAMATION PLANTS
OPERATIONS & MAINTENANCE (O&M) COSTS

Table Basis for Estimating
WT Cost (BuRec Softw are)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WASTEWATER RECLAMATION PLANT ANNUAL O&M SUMMARY					
1	Wastew ater Reclamation Plant	1	LS	$ 23,649,683	$ 23,649,683
	WASTEWATER RECLAMATION PLANT ANNUAL O&M TOTAL COST				**$ 23,649,683**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

PUMP STATIONS
PUMPING ENERGY COSTS

Formula Basis for Estimating
Cost = $0.09 per kW-hr* 0.7457*24*365
Quantity is from WWRRFS Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION ANNUAL PUMPING ENERGY COST SUMMARY					
1	Pumping and Treatment Energy Costs	18,576,524	kW-hr	$ 0.09	$ 1,671,887
	PUMP STATION ANNUAL PUMPING ENERGY TOTAL COST				**$ 1,671,887**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: **WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION[1]**

Date: July 22, 2010

SUMMARY:

Strategy Description: The use of reclaimed wastewater for municipal irrigation of green spaces and golf courses.

Supply Quantity:

Brazoria County –	465 ac-ft/yr in 2060
Fort Bend County –	12,277 ac-ft/yr in 2060
Harris County –	13,431 ac-ft/yr in 2060
Montgomery County –	10,215 ac-ft/yr in 2060

Supply Source: Wastewater Treatment Plant Discharges. Total effluent volume is unknown, however, only a percentage of total effluent volume will be available for reclamation, based on permits.

Total Strategy Cost: Based on relative location of reuse water source and need

Unit Water Cost: $564 per ac-ft of plant capacity capital construction cost, based on previous studies. Average annual unit water cost of $539 per acre-foot

WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION

Introduction

This strategy consists of using reclaimed wastewater to supplement existing and future water supplies that currently serve nonpotable municipal demands within Region H. Wastewater reuse for municipal irrigation of golf courses and maintenance of green spaces in new and some existing communities is a potentially feasible water management strategy. Some existing communities can potentially retrofit existing irrigation systems to use reclaimed wastewater. With growth expected to nearly double in the Houston metropolitan area over the next 50 years, it can be expected that new master-planned communities will be developed in many areas within Brazoria, Fort Bend, Harris, and Montgomery Counties, and this growth would also provide possible candidates for using reclaimed wastewater.

Previous Reuse Studies

Feasibility studies have been previously conducted to analyze the potential for meeting nonpotable water demands with reclaimed wastewater for a number of communities within Region H. The majority of these studies focused on individual master-planned communities (MPCs) or on multiple communities and wastewater treatment plants (WWTPs) organized within a regional authority, including:

- Cinco Ranch
- Cinco Ranch Southwest

[1] This memorandum was prepared using information in the report titled *Wastewater Reclamation for Municipal Irrigation*, prepared by TCB for TWDB.

- Copperfield
- Fairfield Village

These studies examined a number of potential uses for wastewater and determined that the most feasible uses for reclaimed water were for:

- Golf course irrigation
- Green space irrigation, including parks and esplanades
- Maintaining water levels in amenity ponds

The overall cost for these projects was approximately $431 per acre-foot for the 2006 RWP. Scaled to the September 2008 reference date for the 2011 RWP, this is equivalent to $565. However, costs varied depending upon whether the proposed system was included in a newly constructed development or retrofitted into an existing community, the proximity of wastewater demands to WWTPs, and the volume of water delivered.

Wastewater Reuse Demand Analysis

The potential demands for wastewater reuse and wastewater supplies in Brazoria, Fort Bend, Harris, and Montgomery Counties were examined in detail for this study, and the methodology is suitable for projecting potential wastewater reuse for the entire region. Population growth in future MPCs was identified as the most likely candidate for using this strategy. Future MPCs are assumed to represent a portion of the growth within County-Other water user groups (WUGs) in the region. Additionally, in Harris County growth in the NHCRWA, WHCRWA, CHCRWA, and NFBWA WUGs were also considered to have the potential for using this strategy. Therefore, NHCRWA's proposed population growth was added to County-Other for Harris County for purposes of analysis of this strategy.

Data from the Fort Bend Economic Development Council was used to determine that approximately 25 percent of the recent county population growth has occurred in MPCs within Fort Bend County. Because Fort Bend County leads the state in the number of MPCs, it was assumed that this percentage would be representative of the growing trend toward master-planned development within Region H. This percentage was then applied to the total population growth in County-Other WUGs within the growing suburban areas of Region H to determine the population that would be expected to occur in MPCs. Accordingly, this population growth is also assumed to have a similar amount of green spaces, golf courses, and amenity lakes associated with its growth.

The number of golf courses predicted for future development within Region H was determined for the 2006 RWP using data from a variety of sources. A list of courses and the number of golf holes at each location were obtained from the Houston Golf Association and compared to existing population to obtain the ratio of golf "holes" to population. This ratio was then used to project the future anticipated golf course development in the four counties under evaluation. Water demands for these existing golf courses were estimated from well pumpage records and permitted withdrawals from wells in Fort Bend and Montgomery Counties that were known to be associated with golf courses. These demands, on a per-hole basis, were applied to the predicted new golf holes to find the potential golf course water demands through 2060.

The acreage of green space areas projected to accompany future development was estimated from GIS data for Cinco Ranch and Greatwood MPCs in Fort Bend County as part of the 2006 RWP. The area of irrigated esplanades and parks was compared to the total population of each development at ultimate development to find the average per capita acreage of green space for the two communities. This per capita rate was applied to the percentage of County-Other growth expected within MPCs to determine the projected green space acreage for each county through 2060.

Irrigation demands for the expected green space acreage were determined from evapotranspiration and precipitation data obtained from TWDB using a method adapted from Richard Duble of Texas Cooperative Extension. This methodology yielded the ideal average annual application rate for turfgrass irrigation and was used with the projected acreage found above to determine the projected irrigation water demands for green spaces throughout the planning period. This value was determine for the 2006 RWP and is retained for this planning round.

Water demands from amenity lakes associated with population growth in MPCs were estimated from well data information from Fort Bend Subsidence District. Wells that were associated with amenity lakes and were located within named WUGs were identified. The population associated with these WUGs, as reported by TWDB, was compared to the annual pumpage for the wells to determine a per capita amenity lake demand. This per capita demand was then applied to the portion of population growth within County-Other that was expected to occur within MPCs. This value was determine for the 2006 RWP and is retained for this planning round. The projected wastewater demands for each county are shown below in *Table 1*.

Table 1
Projected Potential Demands for Reclaimed Wastewater

County	Potential Reuse Application	Wastewater Reuse Demands (ac-ft/yr)			
		2030	2040	2050	2060
Brazoria	Golf Courses	39	75	115	156
	Green Spaces	60	118	177	240
	Amenity Lakes	17	34	52	69
	Total	**116**	**227**	**344**	**465**
Fort Bend[1]	Golf Courses	1,360	3,018	5,347	7,810
	Green Spaces	982	2,182	3,868	5,647
	Amenity Lakes	284	635	1,124	1,641
	Total	**2,626**	**5,835**	**10,339**	**15,098**
Harris[1]	Golf Courses	994	2,011	3,048	4,082
	Green Spaces	1,762	3,569	5,408	7,245
	Amenity Lakes	512	1,036	1,571	2,104
	Total	**3,268**	**6,616**	**10,027**	**13,431**
Montgomery	Golf Courses	1,653	3,622	6,406	9,640
	Green Spaces	806	1,766	3,123	4,700
	Amenity Lakes	234	513	907	1,365
	Total	**2,693**	**5,901**	**10,436**	**15,705**
Total Potential Reuse Demands		**8,703**	**18,579**	**31,146**	**44,699**

[1] Includes supplies for the Authority WUGs.

Wastewater Reuse Supply Analysis

The amount of wastewater that could potentially be reclaimed for nonpotable uses is subject to both the potential demands for and the supply of treated wastewater. It is important to determine the minimum average flow available since WWTPs typically experience their lowest discharge flows during the summer when irrigation demands are at their highest. The Greatwood community was used as a model for determining the average minimum per capita flow for WWTPs in low-flow conditions. Daily discharge reports from the summer of 2004 were used to generate a report of 5 weeks in this period with no rainfall. The 7-day flow for each of these weeks was averaged to determine the minimum amount of wastewater that could be provided at any time with minimal need for storage. The estimated number of wastewater connections during this time was used to find the per capita low-flow wastewater discharge, assuming a population of 3.2 persons per connection.

Based on the above methodology, the projected availability of reclaimed wastewater throughout the planning period within each county is shown in *Table 2*.

Table 2
Projected Potential Supplies for Reclaimed Wastewater

County	Wastewater Reuse Supply (ac-ft/yr)			
	2030	2040	2050	2060
Brazoria	134	255	385	521
Fort Bend[1]	2,136	4,744	8,403	12,277
Harris[1]	3,833	7,754	11,756	15,745
Montgomery	1,752	3,838	6,787	10,215
Total Potential Reuse Supplies	**7,855**	**16,591**	**27,331**	**38,758**

[1] Includes supplies for the Authority WUGs.

Costs of Implementing a Reuse Strategy

The previous studies examined above were used to determine a unit cost of water for municipal wastewater reuse. These costs varied considerably depending on the following:

- Layout of the community
- New or existing construction
- Amount of water delivered

The average cost of supplying treated wastewater under these proposed scenarios was approximately $564 per acre-foot for construction cost. Standard Region H cost estimation criteria (see Appendix 4C) were used for estimation of other project capital costs. This cost was applied to the lesser of the demand or supply determined for each county to produce the costs shown in *Table 3*.

Table 3
Potential Wastewater Reuse and Associated Costs

County	Potential Demand Reduction from Reuse (ac-ft/yr) / Implementation Cost ($1,000s)			
	2030	2040	2050	2060
Brazoria	116	227	344	465
	$153	$146	$154	$159
Fort Bend[1]	2,136	4,744	8,403	12,277
	$2,825	$3,437	$4,822	$5,105
Harris[1]	3,268	6,616	10,027	13,431
	$4,306	$4,505	$4,501	$4,479
Montgomery	1,752	3,838	6,787	10,215
	$2,309	$2,749	$3,886	$4,517
Total	**7,272**	**15,425**	**25,561**	**36,388**
	$9,583	**$10,837**	**$13,363**	**$14,261**

[1] Includes supplies for the Authority WUGs.

Considerations for Wastewater Treatment Standards and Proper Handling of Wastewater

The Texas Commission on Environmental Quality (TCEQ) classifies wastewater reclaimed for irrigation in two categories: Type I effluent with higher quality standards and Type II effluent that has slightly lower treatment standards. Type II effluent can generally be used in areas with controlled access and minimal potential for human contact. In areas such as parks and esplanades with pedestrian access, reclaimed wastewater must meet higher Type I standards in order to be used for irrigation purposes. The standards for Type I effluent are based on a 30-day average and have the following limits:

- BOD5 or CBOD5 not to exceed 5 mg/l
- Turbidity no greater than 3 NTU
- Average fecal coliform not to exceed 20 CFU/100 ml with a peak no greater than 75 CFU/100 ml

Typical WWTPs in these areas where MPCs are being developed are permitted to 10/15/3 mg/l (CBOD, TSS, $N\text{-}NH_3$) standards. This level of treatment is sufficient for Type II effluent applications, but additional filtration is necessary to improve the effluent quality to Type I standards. The capital cost for this improvement to Type I standards is approximately $1,965,000 for a plant with an average daily flow of 1 mgd.

Likely Communities to Benefit from a Reuse Program

This strategy is focused on the application of reclaimed wastewater for irrigation in municipal settings. In particular, these strategies are recommended for MPCs, especially those that are to be developed in the future. These communities provide a centralized population and wastewater source and a number of water-consumptive amenities such as lakes, golf courses, and green spaces within a close proximity.

New developments may also benefit from reduced costs for implementing a reuse system, since they can be planned using this strategy during the design phase. Major water demands such as for golf courses can be initially located near WWTPs to limit the expense associated with transporting water to the demand. Construction of the effluent distribution system early in the development will also reduce costs associated with laying pipelines around existing utilities and in landscaped areas.

Many of the MPCs that would be the best candidates for wastewater reuse in the Region H area are located within subsidence districts. By implementing a reuse strategy early, before subsidence regulations go into effect, communities can sometimes apply for groundwater credits that will promote better use of the limited groundwater that is available.

Other Potential Wastewater Reuse Options

Other potential participants in a reuse program were examined for this study. Agricultural irrigation for rice represents a sizable potential demand for reclaimed wastewater. The application rate for rice is much higher than for municipal irrigation, and rice farms represent prime users of large volumes of water. Unfortunately, much of the agricultural land where municipal wastewater could most easily be used is now being developed or, in the near future, will be developed into residential communities. Therefore, these agricultural needs do not require a long-term strategy. Other irrigated agricultural operations such as commercial nurseries or turf farms represent potential demand centers that are likely to be in operation for a longer period of time. However, the locations of these operations and their availability as a point of demand are highly variable and therefore, they have not been included in this strategy at this time. Also, the total demand for this source is expected to be relatively small compared to municipal irrigation demand.

Another area of potential demand for reclaimed wastewater is for industrial cooling and process water, particularly in Harris County, but also in all the heavily urbanized areas of Region H. One major strategy for reclaimed wastewater is already included in this plan for the Houston Ship Channel industries. Other smaller opportunities for this application may be present in scattered areas throughout Harris, Galveston, and Brazoria Counties, but these are difficult to quantify and are not included at this time.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns would be addressed during the permitting process for this strategy. However, it should be expected that as reuse increases, instream flows potentially could decrease due to the reduction or elimination of wastewater return flows. However, not all water users will reuse their wastewater, and the increased use of water due to overall growth will most likely offset the impact of reuse as a municipal irrigation water supply strategy. Therefore, the overall reduction in instream flows is not expected to be significant.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazos River Authority System Operations Permit[1]

DATE: November 16, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Use of additional appropriation of water that could be made available through system operations of the BRA's existing water rights and reservoirs.

SUPPLY QUANTITY: 25,350 acre-feet

SUPPLY SOURCE: Brazos River Authority System Supply

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: TBD – based on system rate of $61 per acre-foot

UNIT WATER COST: TBD – based on system rate of $61 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Brazos River Authority has submitted a permit application to the Texas Commission on Environmental Quality (TCEQ) requesting additional appropriation of water that could be made available through system operation of the BRA's existing water rights and reservoirs.

Analysis:

The Region G Water Planning Group evaluated the BRA System Operations Permit as a potential water management strategy for the 2011 RWP. The Brazos G Water Availability Model (WAM) was utilized to determine the availability of water from the BRA System. During the model simulations, BRA contracts are met first from the BRA System, followed by the remaining amount that could be met at the lowest diversion point. This gave the maximum amount that could be realized by the BRA under the agency's current contractual commitments.

The 2006 Region H Plan included a supply from the BRA Systems Operations Permit of approximately 248,650 acre-feet per year. This value included Allens Creek supplies, which are not included in the current estimate. The supply projected to be available in the 2011 plan is 25,350 acre-feet per year.

The reduction in supply is attributed to two major factors:

1. Increased upstream demands supplied by the BRA system.
2. Lower projected return flows from the upper basin.

[1] [1] This memorandum was prepared using information in the 2011 Region G Regional Water Plan.

Upstream Demands

Increases in upstream demands resulting in additional supplies contracted from the BRA System result in a reduction in the supply of water available for downstream appropriation. Additional diversions in the upper basin reduce the efficiency of the BRA system and limit the number of reservoirs that can contribute releases and the ability of the system to utilize unappropriated flows in the basin downstream of the BRA reservoirs. Since the 2006 Plan, current BRA contractual commitments have increased from 600,946 to 670,859 acre-feet per year, an increase of approximately 70,000 acre-feet per year. The System Operations supply that is projected to be supplied to water users in Region G has also increased from 65,482 to 90,197 acre-feet per year, n increase of approximately 25,000 acre-feet per year. The total supply increase in the upper Brazos Basin is approximately 95,000 acre-feet per year.

Projected Return Flows

Changes in the projected return flows can have either adverse or beneficial effects on the supply of water available for appropriation in the lower basin. Increased demands in the upper basin could lead to an increase in projected reuse projects, which potentially reduce the level of projected return flows. Lower than projected growth of WUGs supplied primarily from groundwater sources could also result in lower levels of groundwater based effluent discharged into the Brazos River, reducing projected return flows. Alternatively, increased demands from these WUGs could potentially result in an increase in groundwater based effluent being returned to the stream increasing the level of return flows. The amount of return flows projected to be available in 2060 has declined from 144,000 acre-feet per year estimated in the 2006 Plan to 128,500 acre-feet per year in the 2011 Plan update.

Interruptible Supplies in Region H

An additional analysis was performed to quantify the availability of interruptible supplies available in the lower basin before and after the implementation of the BRA Systems Operations Strategy. By definition, at least 75 percent of an interruptible supply is available at least 75 percent of the time. Interruptible supply was evaluated at the Richmond gage to determine the availability of interruptible supplies in the lower Brazos Basin. Four scenarios were used to evaluate the availability of unappropriated water before and after implementation of the BRA Systems Operations Strategy. The first two models, Brazos G 2010 WAM and the Brazos G 2060 WAM, were used to evaluate the availability of unappropriated flows before the impact of the BRA Systems Operations Permit. The models were obtained from the Region G consultant to evaluate the availability of lower basin supplies under 2010 and 2060 return flow assumptions. The final two models, Brazos G Sys Ops WAM and Brazos G Sys Ops WAM w/ Major WMSs, were used to evaluate the availability of unappropriated flows after inclusion of the BRA System Operations and other major water management strategies in the Brazos Basin. The Brazos G Sys Ops WAM was obtained from the Region G consultant and assumes that the permit is used to create firm supply in the lower basin. The model does not assume that a portion of the BRA firm supply is used to create an interruptible supply. The final model was prepared by updating the Brazos G Sys Ops WAM with other major water management strategies from the 2006 Plan. A summary of the assumptions used in each model are shown in *Table 1*.

Table 1
Scenario Assumptions

Scenario	Return Flows	Sedimentation Conditions
Brazos G 2010 WAM	65,257	2010
Brazos G 2060 WAM	136,123	2060
Brazos G Sys Ops WAM	128,502	2060
Brazos G Sys Ops WAM w/ Major WMSs	128,502	2060

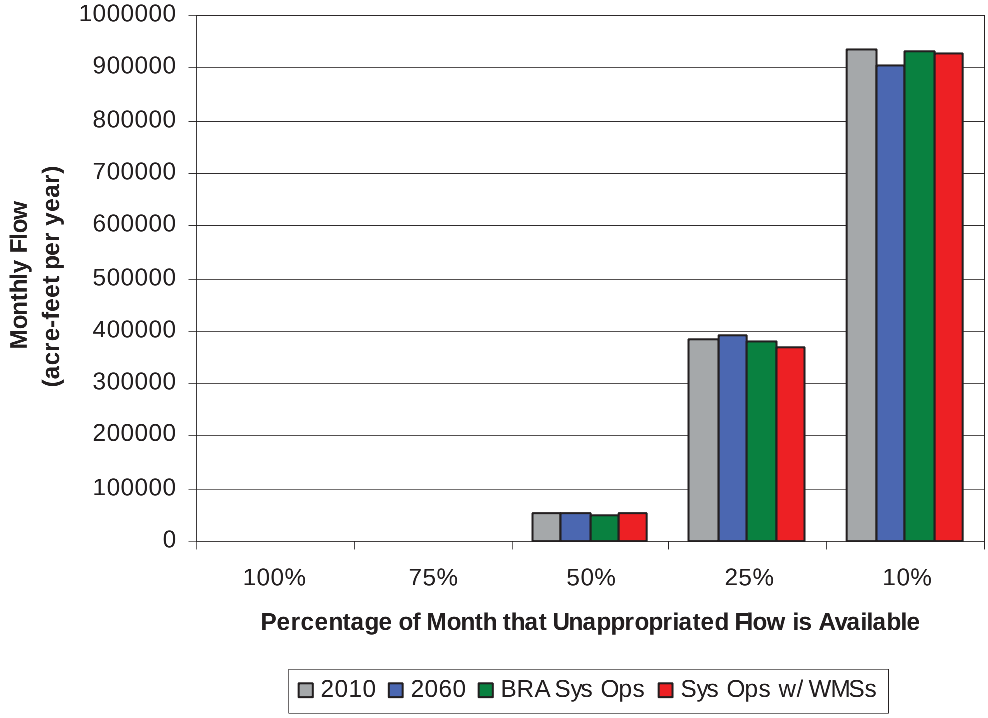
A dummy water right with a junior priority date was added to the models above to test the availability of interruptible supplies using several diversion targets. The dummy water right assumed a diversion pattern similar to other irrigation water rights in the lower Brazos Basin. As shown in *Table 2* there is limited potential for developing interruptible supplies from unappropriated water at the Richmond Gage before and after implementation of the BRA System Operation Permit. The level of unappropriated flow available at the Richmond gage increases slightly from 2010 to 2060 due to an increase in return flows from the upper basin. However, the affect on the annual availability is limited. As shown in *Table 2* below, 75% of the annual diversion target of 1,000 acre-feet per year is available in only 39.7% of the year modeled assuming 2010 projected return flows. Increased return flows in the 2060 condition results in an increased availability of 41.4%. After the implementation of the BRA System Operations Permit, the unappropriated flow available at the Richmond gage is projected to decrease slightly, resulting in reduced availability for potential interruptible supplies. The implementation of the BRA System Operation Permit results in decreased unappropriated flows available to Region H at the Richmond Gage, but does not negatively impact the reliability of existing water rights. This in due to the fact that diversions under the systems operation permit are made at a priority date junior to supplies permitted before October 15, 2004. As a result the permit allows unappropriated return flows to pass downstream to senior water rights in the lower basin before being appropriated by the system Operations Permit.

Table 2
Availability of Interruptible Supplies
(Percentage of Years that 75% of the Annual Diversion Target is Available)

Diversion Target (ac-ft/yr)	Before BRA System Operations		After BRA System Operations	
	2010	2060	BRA Sys Ops	Sys Ops w/ WMSs
20,000	37.9%	39.7%	32.8%	34.5%
10,000	37.9%	39.7%	34.5%	34.5%
1,000	39.7%	41.4%	34.5%	34.5%

Figure 1 illustrates the amount available on a monthly basis at the Richmond gage. On a monthly basis, no supply amount is available in 75% on the months modeled, also indicating limited availability for unappropriated flows that may satisfy the TCEQ 75 – 75 definition of interruptible supply. As a result, unappropriated flows available at the Richmond gage would require off-channel storage to increase the reliability of the supply before and after the implementation of the BRA System Operations Permit.

Figure 1
Unappropriated Flows at the Richmond Gage



Water User Group Application:

The water from the BRA System Operations would serve demands in the Brazos and San Jacinto Brazos basins. Delivery of water would be via the Brazos main stem and the GCWA canal systems.

Environmental Impact:

System Operations permit diverts from stream flows when above median flow, thus reducing peaks. Releases from storage when below median flows, this increasing the flows above diversion points. Permit reduces peak flushing effects due to diversions above median flows. Flows below median are minimally affected.

Issues and Considerations:
No location-specific issues have been identified at this time. It is possible that interruptible supplies could be affected by System Operations. The availability of interruptible supply has not been evaluated in this round of planning.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Houston Bayous Permit
DATE: December 22, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The City of Houston and the San Jacinto River Authority have applied to the TCEQ for supplies identified in the San Jacinto Basin.

SUPPLY QUANTITY: 160,000 ac-ft/yr in Brays, Buffalo, Sims and White Oak Bayous
(not 100% reliable)

SUPPLY SOURCE: Brays, Buffalo, Sims and White Oak Bayous

TOTAL STRATEGY COST: $ 20,956,000 (Costs rounded to nearest $100)

UNIT WATER COST: $ 15.77 to $20.55 per acre-foot at the bayou diversion points

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The City of Houston has submitted a water right permit application for 160,000 acre-feet per year of interruptible supply from four bayous in the lower San Jacinto Basin. This is requested to allow the use of in-basin supply, when it is available, rather than City-owned supply in Lake Conroe in the upper San Jacinto basin or Lake Livingston which must be transferred from the Trinity River Basin. The proposed diversion locations for both applications are shown in Figure 1.

Water rights are considered reliable when the full permit amount may be diverted during drought of record conditions. For all but senior water rights, some storage capacity is usually required to make a water right fully reliable. The TCEQ tests new water rights using the Water Availability Model to determine reliability and the impact on other permits in the basin. It is their practice to only issue water rights for municipal and manufacturing use when the permit will be 100% reliable. Irrigation water rights are issued at a lesser standard of 75% reliable (by volume), 75% of the time. In the case of this applications, only the additional yield in Lake Houston is considered fully reliable. The other permits are for supplies which are available less than 70% of the time. To use these supplies for municipal and manufacturing use, as requested, will require conjunctive use with other, fully reliable supply sources.

WATER USER GROUP APPLICATION

Diversions from the Harris County bayous will capture flows that are occurring in the stream system due to wastewater return flows upstream. Use of this water will offset the need to convey additional water from the Trinity River Basin during wet years.

ISSUES AND CONSIDERATIONS

The City of Houston bayous permit application proposes four new diversion points, located within the city limits, listed in *Table 1* (below). These locations have a greater potential for adverse environmental impact than the Lake Houston diversions. The requested diversions account for 20%

to 40% of the average flow in three bayous, and 40% to 70% in White Oak Bayou (see *Table 1*). Minimum stream-stage or flow-rate must be determined for each proposed diversion site. Without diversion triggers, the permits would allow most flows to be diverted from the bayous during below average conditions, which would impact aquatic habitats. Next, the diversion facilities must be located and any wetland mitigation conducted. Finally, the conveyance system from the points of diversion to the points of use must be constructed, and any mitigation involved with that constructed.

Table 1
Target Diversions and Historic Streamflows

Stream	Target Diversion (average)	Historic Average* (min/max month)	Percentage of Historic Average
Sims Bayou at Reveille Park	20,000 ac-ft/yr 28 cfs	70.4 cfs (min) 151.0 cfs (max)	40% 19%
Brays Bayou at McGregor Park	40,000 ac-ft/yr 55 cfs	139.0 cfs (min) 219.0 cfs (max)	40% 25%
White Oak Bayou at Stude Park	40,000 ac-ft/yr 55 cfs	79.2 cfs (min) 133.0 cfs (max)	69% 41%
Buffalo Bayou at Memorial Park	60,000 ac-ft/yr 83 cfs	202.0 cfs (min) 399.0 cfs (max)	41% 21%

* USGS Gage Data, period of record ending September 2003

For the purposes of this analysis, only the costs of the four diversion pump stations were estimated (*Table 2*, below). Once the City determines how and where to use this water, additional infrastructure conveyance and treatment facilities will need to be estimated and included in the water cost. Included on Figure 1 are the locations of the City of Houston East and Southeast Water Purification Plants. The four proposed diversion points range from seven to twelve miles from the East WPP, which is the closest of the three existing plants. Alternately, the City may elect to treat the water at the respective diversion points and feed the water into the treated water distribution system.

Table 2
Potential Bayou Diversion Costs

Location	Diversion Average Rate	Facility Size* and Cost	Cost per Acre-Foot**
Sims Bayou at Reveille Park	28 cfs 18 mgd	100 hp $3,139,000	$ 20.55
Brays Bayou at McGregor Park	55 cfs 36 mgd	200 hp $ 5,451,000	$ 18.23
White Oak Bayou at Stude Park	55 cfs 36 mgd	200 hp $ 5,451,000	$ 18.23
Buffalo Bayou at Memorial Park	83 cfs 54 mgd	300 hp $ 6,915,000	$ 15.77

* Assumed 25-ft lift from bayou to plant, 80% system efficiency
** Unit cost reflects 6% interest over 20-years, 2.5% annual O&M and power at $0.09/kWh

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazoria County Interruptible Supply for Irrigation

DATE: December 28, 2009

SUMMARY

STRATEGY DESCRIPTION: Use of interruptible portions of the GCWA "Chocolate Bayou" water right to meet irrigation shortages in Brazoria County.

SUPPLY QUANTITY: Up to 124,000 acre-feet per year available (64,000 acre-feet per year once GCWA Off-Channel Reservoir is constructed)

SUPPLY SOURCE: Brazos River via GCWA Canal System

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $0

UNIT WATER COST: GCWA contract rate

Water Management Strategy Analysis Description

Introduction:

For the 2011 RWP, significant shortages are calculated for irrigation WUGs in Brazoria County. Subsequent to application of demand reduction through the Irrigation Conservation WMS, Brazoria County irrigation shortages remain as high as 63,000 acre-feet per year. See Table 1-8 in *Chapter 1* for a list of major irrigation demand centers in Region H. Commentary from the Region H Planning Group as well as local experience indicates that demands for irrigation, which are based on demands during a higher-production period in the 1990s, are no longer at the levels indicated by the RWP. However, as revision of these demands is outside of the scope of the current RWP. As such, these projected shortages must be met.

Two factors prevent these shortages from being met by firm supplies from a major water management strategy. The first is timing, with irrigation shortages in Brazoria County projected for 2010 through 2060. The second factor is cost, with irrigators having limited ability to fund capital projects. The only viable solution to meet irrigation shortages in Brazoria County is use of the interruptible portion of an existing GCWA water right.

Analysis:

The GCWA water rights in the Brazos and San Jacinto-Brazos basins were analyzed as a potential source of interruptible supply due to their proximity to existing irrigation demands. The GCWA System was analyzed as two separate systems described below.

1.1 GCWA A&B System

The Gulf Coast Water Authority "A&B" System is comprised of two water rights C5168 and C5171, both of which divert water from the Brazos River. Water right C5168 has a permitted diversion of 125,000 acre-feet per year and pumps water directly into the GCWA "A" Canal. Water right C5171 has a permitted diversion of 99,932 acre-feet per year delivering water to the GCWA "B" Canal. The GCWA A&B Canals run in a southeast direction beginning from diversion locations on the Brazos River. The Canal System provides raw water to GCWA customers primarily to municipal and industrial water users in Fort Bend and Galveston Counties. The Canals can also provide surface water to irrigation demands in Fort bend and Galveston Counties.

1.2 GCWA JC System

The Gulf Coast Water Authority "JC" System consists of the two former CBWC water rights C5322 and C5357. Historically, the two water rights have been operated separately. Water right C5322 has been used primarily to supply irrigation demands with Brazos River water from the "C" Canal and water right C5357 has been used to meet industrial and irrigation demands with water from bayous in the San Jacinto – Brazos coastal basin ("J" System). The presence of existing conveyance infrastructure in close proximity to irrigation demands is an important factor for developing interruptible supplies. Interruptible water supplies available from the existing GCWA "JC" System would be a likely candidate for meeting irrigation shortages in Brazoria County.

2. Interruptible Supplies

In order to quantify the amount of interruptible water available in each GCWA System, diversions for municipal and industrial contracts were assumed to be made prior to irrigation diversions. The assumption allowed only the water remaining after municipal and industrial diversions were made to be analyzed by applying the TCEQ 75-75 rule.
The analysis of the interruptible portion available in each system was performed using an annual test to determine the percentage of time that 75 percent of the annual diversion target is met when distributed on a monthly basis.

This is recognized in TCEQ rules for surface water rights permitting, which allow issuance of water rights permits for irrigation use that are less than 100 percent reliable during critical drought periods. Specifically, in consideration of applications for new irrigation use permits, TCEQ applies a "75/75" rule where:

"Approximately 75 percent of the water requested must be available approximately 75 percent of the time when distributed on a monthly basis and based on the available historic stream flow record (30 TAC, Chapter 297 – Section 297.42 (c))."

2.1 GCWA System

The GCWA System was modeled to reflect the "AB" Canal and the "JC" Canal System separately. As described previously, the GCWA "AB" System is comprised of two water rights (C5168 and C5171). In addition to the run-of-river rights, the GCWA also has three contracts for surface water from the BRA which can be diverted at either water right location. Diversions made at these locations were adjusted with a return flow factor added into the model to reflect conveyance losses. The return flows were returned to a dummy control point "GCWAAB". Table 1 below, lists the water rights, contracts used to model the GCWA "AB" Canal System.

Table 1 – GCWA "AB" Canal System

Water Right	Annual Diversion (ac-ft/yr)	Return Flow Factor	Dummy Control Point
C5168	125,000	0.85	GCWAAB
C5171	99,932	0.85	GCWAAB
BRA AB	28,333	0.9	GCWAAB
BRA AB	9,335	0.9	GCWAAB
BRA AB	3,100	0.9	GCWAAB

The GCWA “JC” Canal System consists of water rights C5322 and C5357. In addition to the two water rights, the GCWA also has a contract with the BRA for an additional 5,625 acre-ft per year. Diversions made from these locations were adjusted with a return flow factor and to represent conveyance losses and were returned to a dummy control point “GCWAJC” as shown in *Table 2*.

Table 2 – GCWA “JC” Canal System

Water Right	Annual Diversion (ac-ft/yr)	Return Flow Factor	Dummy Control Point
C5322	155,000	0.85	GCWAJC
C5357	57,500	0.85	GCWAJC
BRAJ	5,625	0.9	GCWAJC

2.2 GCWA System Diversions

Dummy water rights were added to GCWA System dummy control points to represent municipal and industrial demands that are satisfied prior to irrigation contracts. The water rights were modeled with a constant diversion pattern to simulate the municipal and industrial contracts. Dummy water rights CGWA_1 and GCWA_2 were added to dummy control points GCWAAB and GCWAJC respectively. The diversion targets associated with each water right are shown in *Table 3*.

Table 3 – GCWA Municipal and Industrial Diversions

Dummy Water Rights	Dummy Control Point	GCWA Canal System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	24,937

Additional water rights were added to the model to quantify the availability of interruptible supplies. The diversions were simulated with a priority date junior to the GCWA municipal and industrial diversions. The interruptible water rights were modeled using an irrigation pattern “IRR4” similar to other irrigation water rights in the lower Brazos Basin. *Table 4* identifies the GCWA water rights used to evaluate the interruptible supply available in each system.

Table 4 – GCWA Interruptible Diversions

Water Rights	Control Point	System
GCWA_3	GCWAAB	AB
GCWA_4	GCWAJC	JC

3. Interruptible Supply Iterative Analysis

3.1 Existing Conditions (Before GCWA Off-Channel Reservoir)

The amount of interruptible water available from each system was quantified by iteratively adjusting the diversion target of the interruptible water right until 75% of the requested annual diversion target was available in 75% of the years modeled. The 2REL table was generated after each model run to record the reliability of each diversion target. The reliability of the interruptible water rights at various diversion targets is shown in *Tables 5* and *6*. Water rights GCWA_3 and GCWA_4 are 75-75 reliable at diversion targets of 40,000 acre-feet per year and 84,000 acre-feet per year.

Table 5 – GCWA_3 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_3	50,000	0	0	0	0	72.4	91.4
GCWA_3	40,000	0	0	0	0	79.3	93.1
GCWA_3	30,000	0	0	0	0	81.0	93.1

Table 6 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	100,000	0	0	0	0	46.6	89.7
GCWA_4	90,000	0	0	0	0	62.1	91.4
GCWA_4	89,000	0	0	0	0	63.8	91.4
GCWA_4	85,000	0	0	0	0	74.1	93.1
GCWA_4	84,000	0	0	0	10.3	75.9	93.1
GCWA_4	80,000	0	0	0	29.3	77.6	96.6

3.2 Interruptible Supply with GCWA Reservoir

The GCWA off-channel canal reservoir was added to enhance the reliability of the GCWA municipal and industrial demands. In previous exercises, the total annual amount made reliable by incorporating the GCWA reservoir into the model was approximately 298,155 acre-feet per year. It was assumed that the same amount would be made reliable in this scenario. To produce a total “firm” municipal and industrial supply of 298,155 acre-feet per year, 53,868 acre-feet per year were added to the annual diversion target of water right GCWA_2. The resulting “firm” diversions for municipal and industrial uses are reflected in the *Table 7* below:

Table 7 – GCWA “Firm” Demands (with Reservoir)

Water Rights	Control Point	System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	78,805

The interruptible supply available from the GCWA "JC" system (Note, an interruptible diversion was not modeled for GCWA_3 in this scenario) was evaluated using an iterative process and is shown in *Table 8*. Approximately 28,000 acre-feet per year is 75% reliable 75% of the time. Under this scenario, the total additional "firm" supply available to the GCWA system is approximately 53,800 acre-feet per year. The additional interruptible supply available is approximately 28,000 acre-feet per year.

Table 8 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	30,000	0	1.7	32.8	55.2	74.1	91.4
GCWA_4	28,000	0	1.7	32.8	55.2	77.6	91.4
GCWA_4	25,000	0	1.7	34.5	56.9	77.6	91.4
GCWA_4	20,000	0	1.7	36.2	58.6	79.3	91.4

3.3 Interruptible Supply with GCWA Reservoir - Alternative

An alternative scenario was run with a reduced "firm" supply available to the GCWA system after the inclusion of the GCWA reservoir. The "firm" supply available was reduced from 53,800 acre-feet per year to 39,500 acre-feet per year as previously modeled in the GCWA Off-Channel Canal Reservoir. The alternative interruptible supply scenario was modeled by adding 39,527 acre-feet per year to the annual diversion target of water right GCWA_2. The alternative diversion targets are shown in *Table 9* below.

Table 9 – GCWA "Firm" Demands (alternative scenario)

Water Rights	Control Point	System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	64,464

Reducing the firm diversion from the system with the GCWA off-channel reservoir increased the availability of interruptible supplies available. *Tables 10* and *11* show the reliability of the interruptible diversions at different diversion targets. Approximately 7,000 acre-feet per year and 57,000 acre-feet per year, diverted from water rights GCWA_3 and GCWA_4 respectively, is 75-75 reliable

Table 10 – GCWA_3 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_3	10,000	0	0	0	0	74.1	93.1
GCWA_3	8,000	0	0	0	0	74.1	93.1
GCWA_3	7,000	0	0	0	0	75.9	93.1
GCWA_3	5,000	0	0	0	0	77.6	93.1

Table 11 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Achieved

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	60,000	0	13.8	34.5	50	74.1	89.7
GCWA_4	58,000	0	15.5	36.2	50	74.1	91.4
GCWA_4	57,000	0	17.2	36.2	50	75.9	91.4
GCWA_4	55,000	0	17.2	44.8	50	75.9	91.4

4. Summary of Modeling Scenarios

The development of interruptible supplies from the existing GCWA water rights and contracts produces the highest yields before the GCWA reservoir is constructed. Once the reservoir is built, the availability of interruptible supplies from both the GCWA "AB" and the "JC" Canal Systems is highly flexible. Additional "firm" supplies can be provided from the Off-Channel Canal Reservoir resulting in reductions in the interruptible supplies available to irrigators. The results of the three scenarios are summarized in *Table 10*.

Table 10 – GCWA Diversions (ac-ft/yr)

GCWA Diversions	Base	GCWA Reservoir	GCWA Reservoir Alternative
M & I Diversions	244,287	244,287	244,287
Add. Diversions from Reservoir	-	53,868	39,527
Interruptible Supply (GCWA_3)	40,000	-	7,000
Interruptible Supply (GCWA_4)	84,000	28,000	57,000

Water User Group Application:

Water from the Brazoria County Interruptible Irrigation WMS may be used to serve irrigation customers in Brazoria County in the Brazos, San Jacinto-Brazos, and Brazos-Colorado Basins. Delivery to customers would be via the GCWA Canal System.

Issues and Considerations:

The GCWA Off-Channel Reservoir is reflected in the 2011 RWP as operational by 2030. This reservoir, which would store interruptible supplies, would reduce the yield of interruptible irrigation water.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazos Saltwater Barrier

DATE: December 28, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Lower Brazos Saltwater Barrier

SUPPLY QUANTITY: Improve efficiency of using existing supplies by potentially confining the salt wedge to downstream of various locations on the lower Brazos River.

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020 to 2030

TOTAL STRATEGY COST: $44,470,700 (Costs rounded to nearest $100)

UNIT WATER COST: n/a - This strategy does not increase yield but does improve water quality

INFLUENCE OF SALT-WATER WEDGE IN THE LOWER BRAZOS RIVER

Introduction

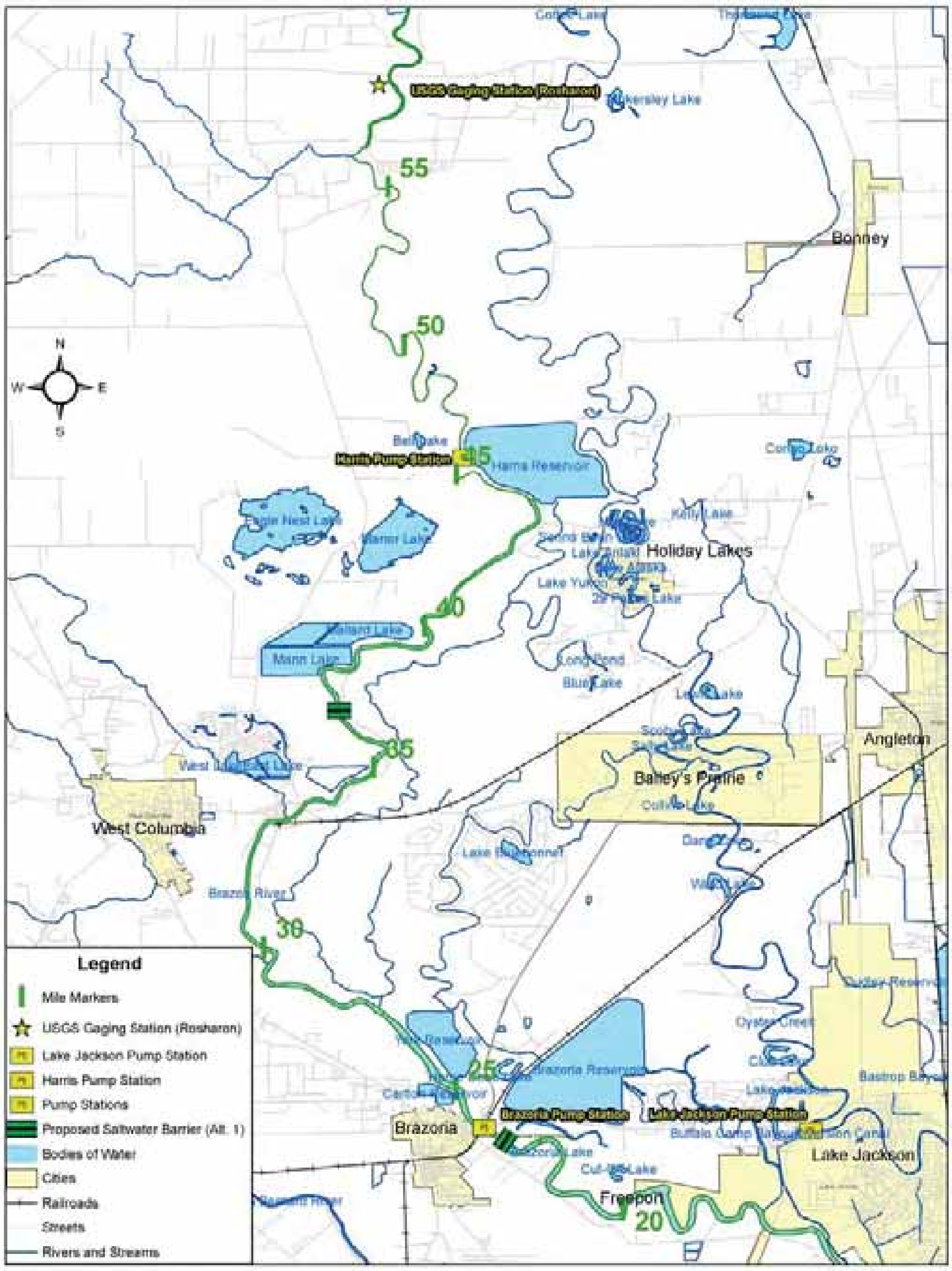
The Lower Brazos River is tidally influenced, with the extent of the area of brackish water fluctuating seasonally. Municipal and industrial water users in the Freeport area face water quality concerns as the saltwater wedge moves upstream of the Brazoria Pump Station during periods of low flow in the Brazos River. The purpose of this feasibility study is as follows:

- Quantify the impact on local water users in terms of quality and reliability of fresh water supply.
- Determine the potential size, location and operating requirements for a saltwater barrier in the Brazos River.
- Determine the cost and feasibility of installing a pipeline from Harris Reservoir to Brazoria Reservoir to preserve water quality by avoiding utilizing the bed and banks of Oyster Creek and offsetting the need for a traditional barrier system.

Analysis

Background
There are many factors that affect the location of the salt wedge in the Brazos River. Figure 1 illustrates the Brazos River and notes key features that will form the basis of this analysis and discussion.

Figure 1
Map of Lower Brazos River



The Dow Chemical Company owns water right 12-5328, which authorizes the diversion of 305,656 acre-feet per year from the Brazos River for industrial, municipal and irrigation use. Dow provides a portion of this supply to meet the needs of eight surrounding industries in Brazoria County. The Brazosport Water Authority (BWA) owns water right 12-5366, which authorizes the diversion of 45,000 acre-feet per year from the Brazos River for municipal use. The BWA provides treated water to the cities of Angleton, Brazoria, Clute, Freeport, Lake Jackson, Oyster Creek and Richwood, as well as two TDCJ prison units in Brazoria County. These are the two most-downstream water rights for municipal and industrial demand. The U.S. Department of Energy holds water right 12-5332 downstream at the mouth of the Brazos River, but it is primarily for mining (non-potable) use. Within Brazoria County there are several irrigation water right holders on the Brazos River, but all divert above Dow and BWA. Dow has a 16,000 ac-ft contract with Brazos River Authority for water quality releases.

Dow and the BWA share diversion and storage facilities along the Brazos River. As illustrated in Figure 1, the Brazoria pump station is located at river mile 24, and diverts river flows into the Brazoria Reservoir (off-channel). The reservoir is permitted to store 21,973 acre-feet of water. Water released from the reservoir flows into Buffalo Camp Bayou, and thence to the BWA treatment plant in Lake Jackson and the Dow inlet at their Freeport Plant. The Harris pump station is located at river mile 44, and diverts into Harris Reservoir (also off-channel). The reservoir is permitted to store 10,200 acre-feet of supply. Water released from Harris Reservoir flows into Oyster Creek above the City of Angleton, and is transferred to Buffalo Camp Bayou downstream at the Lake Jackson pump station.

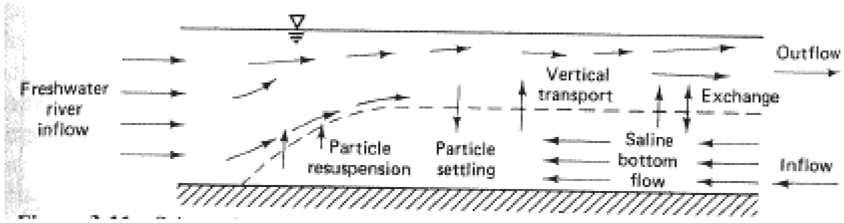
Local Influence of Salt Wedge

The TCEQ Water Quality Inventory defines the Brazos River as tidal below river mile 25, which corresponds to the observed situation at the Harris and Brazoria pump stations. Measured salinities at the Harris pump station range from 50 parts per million (ppm) to 200 ppm, which is typical for river flows. Measured salinities at the Brazoria pump station range from 100 parts per million (ppm) to values in excess of 10,000 ppm. Seawater has a salinity of 3.5%, or 35,000 ppm, causing the tidal reach of the Brazos River to become brackish during lower flows. (For comparison, typical values in Galveston Bay are approximately 15,000 ppm.) This brackish zone decreases in an upstream direction, and also stratifies within the channel, with the denser brackish water below the less-dense fresh water. This forms a triangular zone of brackish water, referred to as a salt wedge (see Figure 2). TCEQ Rule 30 TAC 290 – Public Drinking Water, defines a secondary standard for Total Dissolved Solids (TDS) less than 1,000 ppm. Due to the expense and effort required to desalinate brackish water, Dow and BWA divert at their upstream pump station (Harris) when salinities at Brazoria exceed approximately 500 ppm. Note that while seasonal use of the Harris intake is normal and expected, permanent use of this intake would effectively remove the Brazoria Reservoir from the Dow/BWA system, decreasing the yield due to the loss of storage capacity.

Figure 3 illustrates the salt content in ppm at the Brazoria and Harris pump stations vs. the Brazos River stream flow as recorded by the USGS station at Rosharon and is based upon data from January 1996 through December 2003. Note that the nearest USGS station is at Rosharon (mile marker 57) upstream of both Brazoria and Harris pump stations. The stream flow at Rosharon does not exactly correlate with the stream flow at Brazoria and Harris pump stations due to the distance between the locations and three irrigation water rights diversions which exist in this stretch of the Brazos River. There is, however, satisfactory correlation to conduct statistical trend analysis comparing stream flows to the salinity in the Brazos River at Brazoria and Harris pump stations. During periods of high flow in the Brazos, local streamflow pushes the salt wedge to the lower Brazos, downstream of the Brazoria pump station. The objective of this statistical analysis is to determine:

- What stream flow is required to keep the salt wedge below the Brazoria pump station and;
- What is the historical probability of Brazos stream flows exceeding this limit?

Figure 2
Schematic of Two-Dimensional Flow in Estuary

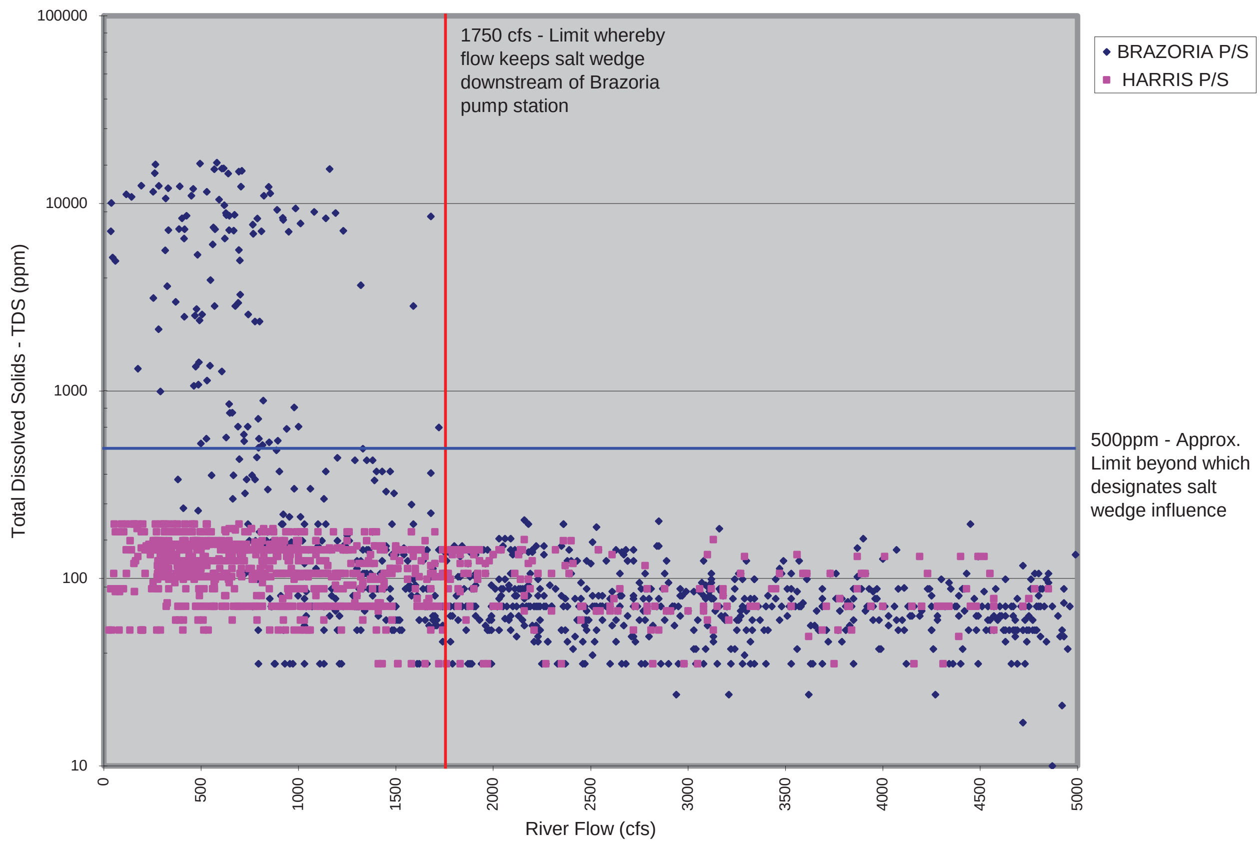


From Thomann, 1987

As illustrated in Figure 3, the salt wedge in the Brazos River does not currently reach the Harris Pump Station. The data also shows that the Brazoria Pump Station is intermittently affected by the salt wedge, particularly during periods when the flow in the Brazos River at Rosharon is less than 1750 cfs. Based on statistical analysis of stream flow data from the USGS Rosharon Gage, it is determined that 1750 cfs corresponds to the 33 percentile mark in the dataset. Therefore, historically the Brazos river stream flow has been insufficient to protect the Brazoria pump station from the salt wedge in a third of cases.

It should also be noted that all reliable flows in the lower Brazos River are fully allocated. That is, during drought of record conditions (and full consumptive use), there is only flow available to meet existing senior water rights. Return and unused flows, which currently maintain the salt wedge position, cannot be expected during drought conditions. Although not all of these flows will be diverted, the net flows in the lower Brazos will be reduced when compared to historical stream flow data, increasing the frequency of the salt wedge affecting the Brazoria pump station. Of particular concern are the Fort Bend Subsidence District groundwater reduction rules. Under the 2003 regulatory plan, communities in Fort Bend County must begin using surface water in 2013. The source of all or most of this water will be the Brazos River.

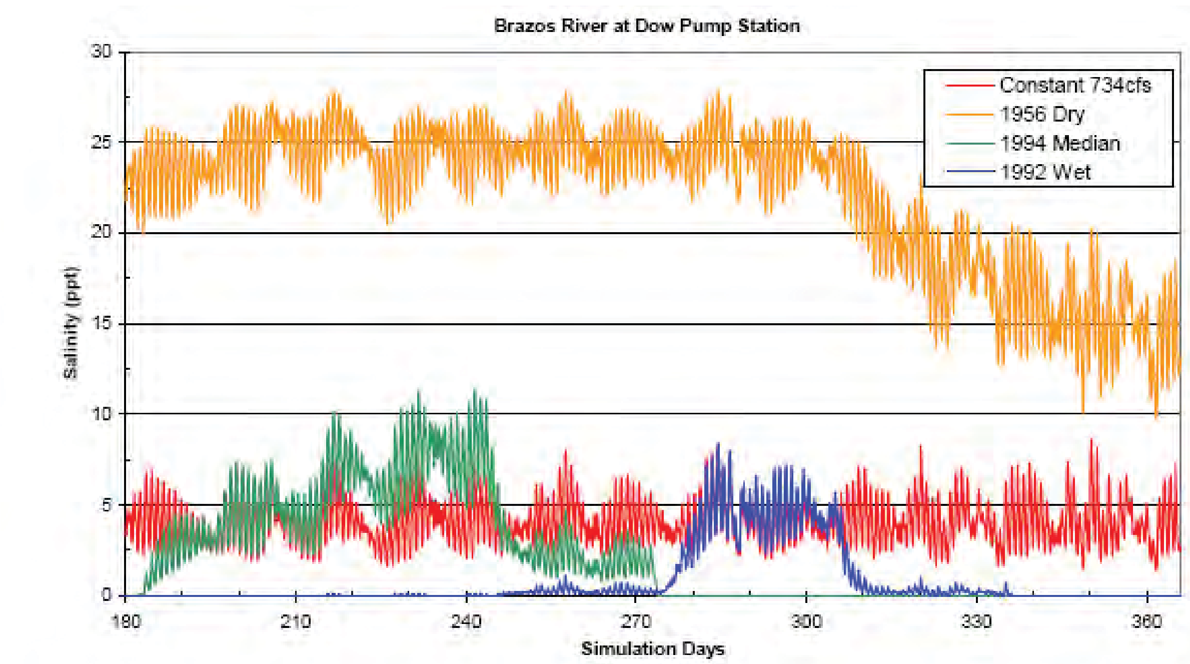
Figure 3
Salinity Vs Stream Flow (Brazos River @ USGS Rosharon Gauging Station)



In the Analysis of Instream Flows for the Lower Brazos River (TWDB, 2004), the TXBLEND3D salinity model was created and calibrated for the Brazos River below SH 36. This model was then run using flows from representative years from the TCEQ Water Availability Model Run 3 (0% return flows), and at a constant flow based on the Allens Creek Reservoir permit condition. The results of the simulations are shown in Figure 4. As can be seen, under full-utilization, the salinity at the Brazoria pump station will exceed the 500 ppm limit (0.5 ppt) in all but the wettest months. In the Brazos G WAM used for planning in this report, some return flows are included. However, that only increases the lowest monthly flow in the simulation (July 1956) from 150 acre-feet to 1,260 acre-feet. That flow is equivalent to the flow in November 1956, resulting in a peak salinity of 21,000 ppm.

During the periods when the salt wedge pushes upstream of the Brazoria pump station, the Harris pump station is used to supply raw water to Dow Chemical and the Brazosport Water Authority. Between the Harris Reservoir and the Lake Jackson Pump Station, there are two wastewater plant discharges, and the Justice Scott State Prison Farm. The wastewater plants discharge up to 4.05 mgd of treated effluent into Oyster Creek. A review of the EPA NPDES database shows that both facilities are operating within their permit requirements (no exceedance violations), but there is an increase in nutrient loading nonetheless. The state farm is a potential source of non-point source pollutants, predominantly nitrogen and phosphorus from fertilizers. These factors reduce the raw water quality of flows conveyed using the bed and banks of Oyster Creek. This reduced water quality increases the treatment cost, making it preferable to use to the Brazoria pump station to the greatest extent possible. It is expected that the majority of this additional cost is associated with the additional filtration needed. This additional filtration requires increased coagulant dosage (alum and other polymers) and a shortened cycle time for sand filters, thereby reducing their efficiency and increasing cost. There may also be additional cost for pathogen controls but this is not anticipated to be significant compared with water from the Brazoria pump station.

Figure 4
Mid-depth, mid-channel salinity at the Dow Chemical diversion point using four different river flow scenarios



From <u>Analysis of Instream Flows for the Lower Brazos River</u> (TWDB, 2004)

As an alternative to using the Harris pump station, Dow and BWA may purchase stored water from the Brazos River Authority (BRA). The BRA operates a system of reservoirs in the middle and upper basin, and by releasing stored water for diversion downstream, the base flow of the Brazos River can be raised above the 1750 cfs required to hold the salt wedge below the Brazoria diversion point. This strategy has several drawbacks. First, the nearest BRA reservoir is over 100 river miles upstream, making any release subject to channel losses and erroneous diversions by other water rights holders. Second, it requires releasing stored water during the drier periods when the salt water wedge is not already controlled by the stream flows. Finally, the BRA requires payment for this water, with a current system rate of $44 per acre-foot. Using NPV analysis, the cost of additional water is more than the cost of additional treatment and pumping required during periods when the Harris pump station is used.

The spring high tide for Freeport on the Brazos River is approximately 2.5-ft and it is evident from Figure 3 that the tidal influence extends beyond the Brazoria pump station. However, to ensure seasonal supply reliability for Dow Chemical and the regional water users, only the Harris pump station must be protected from the salt wedge. While some bathymetry exists from the 1988 FEMA flood study, the limited cross sections across the river only provide a small number of data points within the area of interest. In the section of the Brazos River between the Brazoria and Harris Pump Stations the channel bottom undulates between -33 to -9 feet (Datum - Mean Sea Level). Making a few assumptions, a basic estimation of the salinity at the Harris pump station may be made using the equations below. Based on this analysis (Table 1), the salt wedge clearly exerts no influence at the previously identified threshold of 1750 cfs. However, when the flow is modeled at 734 cfs, the tidal range of salinities at the Harris intake exceeds the desired limit of 500 ppm. It may be inferred that flows between 800 and 900 cfs will reliably protect the upper intake. When the drought-of-record conditions are modeled, the upstream salinities are greater than 90% of the salinity at the Brazoria intake.

$$s_x = s_0 \exp\left(\frac{Ux}{E}\right)$$ From Thomann, Eq. 3.11a

Where: s_x = salinity at a point x, for x<0
s_0 = salinity at a point x = 0
U = net non-tidal velocity = Q/A
x = distance (negative upstream, positive downstream)
E = coefficient of dispersion
A = WD (width x depth)

Assume a uniform channel between the Harris and Brazoria intakes:
W = 500 feet (from FEMA flood study, 1989)
D = 20 feet (from TWDB study, 2004)
A = 10,000 sq-ft
E = 250 m^2/s = 2700 ft^2/s (after Raina, 2004)
x = (25 mi – 44 mi) = -19 mi = -100,320 feet

Table 1
Estimated salinity at Harris intake based on modeled salinity at Brazoria intake

S_0	Q	A	U	E	x	S_x
ppm	cfs	sq-ft	fps	ft^2/s	ft	ppm
400	1750	10,000	0.175	2,700	-100,320	0.6
5,000	734	10,000	0.073	2,700	-100,320	327.0
9,000	734	10,000	0.073	2,700	-100,320	588.6
27,000	2.4	10,000	0.000	2,700	-100,320	26,760.3
22,000	20.5	10,000	0.002	2,700	-100,320	20,386.5

These estimates are based on an assumption of full mixing, which is not likely to occur given the irregularity of the channel bathymetry. Additionally, both this estimate and the TXBLEND3D model assume uniform flow during the entire monthly period, which is also unlikely. A topic for follow-on study would be extension of the TXBLEND3D model to a point above the Harris intake, with model runs using actual daily flows during low periods to better determine the relationship between these sites and the actual risk of salt intrusion.

In summary, all available evidence indicates that the salt wedge's influence does not currently extend to the Harris pump station. However, it is projected that future conditions of increased diversions and reduced return flows, coupled with a severe drought would allow the salinity to become unacceptable at the Harris pump station. It is recommended that additional bathymetry data should be obtained for future modeling studies as this project progresses. It should also be noted that the Brazoria Reservoir is important to ensure the yield of the Dow and BWA water rights. There are benefits from installing a saltwater barrier downstream of the Brazoria pump station under the current conditions, simply to decrease the raw-water conveyance and treatment costs, which will be investigated further in this report.

Conceptual Design for Saltwater Barrier

There are multiple differing design concepts for a saltwater barrier in the lower Brazos River. Based upon the influence of the saltwater wedge previously detailed in this report the barrier should be located downstream of the Brazoria pump station as shown in Figure 6.

Alternatively, the saltwater barrier could be located further upstream to protect only the Harris Reservoir. This may be more cost effective if current bathymetry data can be obtained so that a relatively narrower or shallower point in the river can be found, thus reducing the construction costs of a saltwater barrier (Figure 7). However, from the bathymetric data currently available, a location cannot be identified to show any calculable cost savings.

There are a number of issues that need to be considered during conceptual design including:

- Stream navigability.
- Regional flood levels.
- Environmental considerations

With regard to navigation requirements of the Brazos River, pleasure craft are the only known category that utilizes this section of the stream. During the course of this feasibility report the U.S. Corps of Engineers and the Port of Freeport were contacted to evaluate any commercial navigation requirements. They reported that very occasionally a commercial vessel travels up the lower Brazos River, but only to service Dow Chemical, which is downstream of the proposed barrier location and would not be impacted by the structure. For shallow-draft pleasure craft, a submerged barrier (weir or inflatable barrier) may be considered. However, during low flow periods, the depth of flow over a submerged barrier would be minimal and would pose a hazard to navigation. Additionally, an inflatable barrier would be at risk of puncture by debris carried by storm flows. Therefore, it is preferable to have a gated structure to ensure boating safety and navigability. A saltwater barrier recently completed on the Neches River (as shown in Figure 5) offers a conceptual design for this location (note the navigation channel at the upper left end of the structure). However, the Neches River experiences more commercial traffic and therefore the gated structure for the Brazos is expected to be smaller.

To assess flooding potential, FEMA HEC-2 data and output were obtained for the lower Brazos region. The digital model was not available, but the data and output reports were reviewed with a view to the likely impact and significance of flooding resulting from the proposed saltwater barrier. The flood report details that in this region (between Brazoria and Harris reservoirs), local flooding is mainly influenced by raised local highways and railways crossing through the floodplain, which act as flood retarding structures as illustrated in Figure 8 and Figure 9. The impact from a major flood (1 in 100 years) will be primarily controlled by these retarding structures, but smaller storm events may have a local impact resulting from the proposed saltwater barrier. As the tidal range in the Brazos River is approximately 2.5-feet, the barrier should not be particularly high relative to the river banks, which will significantly limit the impact on upstream flooding. The conditions of sub-critical flow and relatively low barrier mean the local velocity can increase to adjust for reduced cross-sectional area as the water goes over the saltwater barrier, thereby minimizing the impact on upstream flood level. This is a very general overview of the potential flooding impact and detailed analysis of local flooding will need to be investigated for a variety of stream flow cases if this project were to be pursued. This analysis would require additional local survey data, particularly as the community of Brazoria is adjacent to the river in this location and the full range of stream flows in the Brazos will have varying hydraulic impacts as it goes over the proposed saltwater barrier. The existing FEMA study was undertaken in 1989 and reviewed as part of this study. The digital model is not available and therefore this survey, data collection and modeling will need to be undertaken as this project progresses.

Figure 5
Neches River Saltwater Barrier

Photo by U.S. Army Corps of Engineers

Figure 6
Proposed Saltwater Barrier Location (Alternate 1)

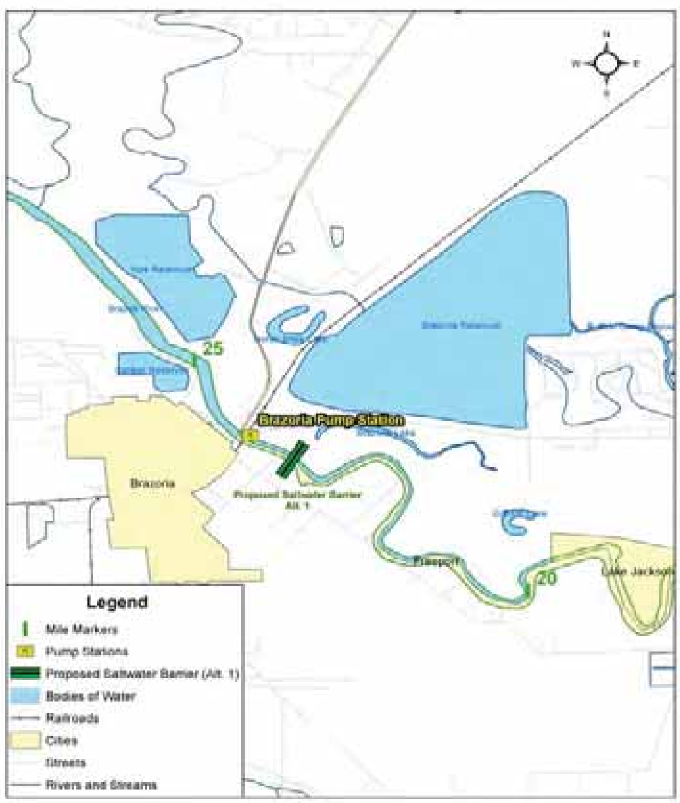


Figure 7
Proposed Saltwater Barrier Location (Alternate 2)

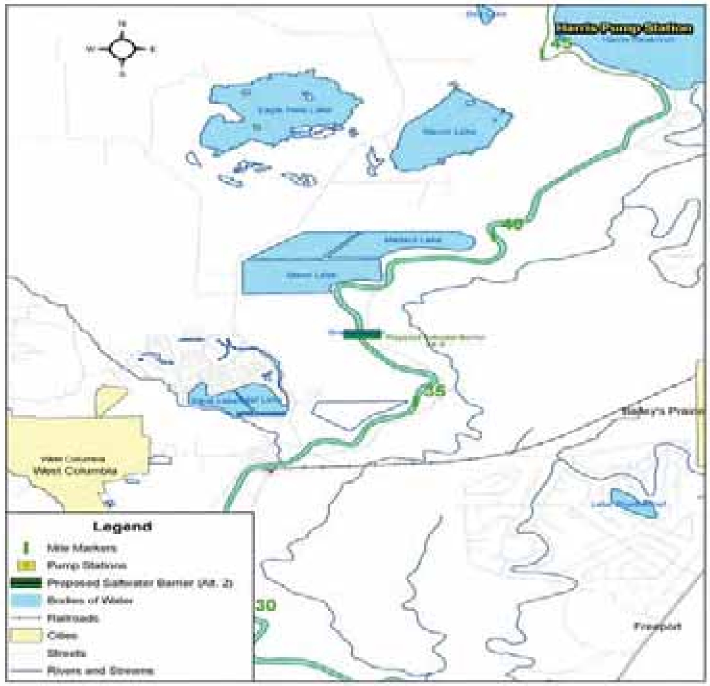


Figure 8
Photo illustrating elevated highway across Brazos flood plain

Figure 9
Photo illustrating elevated railway across Brazos flood plain (adjacent to Brazos River).

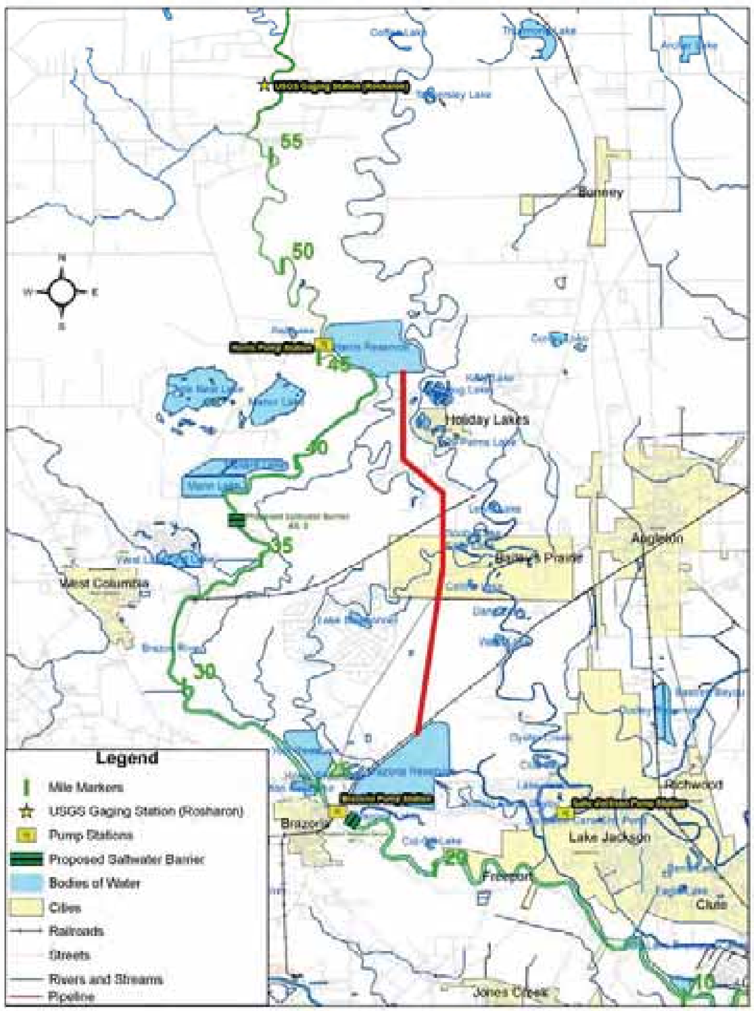
The construction of the proposed Brazos Saltwater Barrier may have both temporary and permanent impacts on the Brazos estuary, and the downstream and immediate upstream reaches of the Brazos River. Temporary construction may include such impacts as increased turbidity, BOD and contaminant loads in the river, depending on the nature of the sediment entering the river due to disturbance of river bottom sediments and adjacent upland areas. These impacts could be expected to occur in the project area and points downstream on the Brazos River to as far south as the Gulf of Mexico and the Brazos River Estuary. Long-term impacts would result from changes to flows in the River as a result of the operation of the barrier. These impacts could include impediments to fish migration, changes (reductions) in the amounts of sediments and nutrients reaching the Gulf of Mexico and Brazos Estuary, localized changes in hydrology of adjacent wetlands downstream of the facility, and increased sedimentation in the river channel immediately upstream of the barrier. It should be noted that the Brazos River Estuary is one of the smallest and least productive in the State. The project may also result in permanent impacts to any upstream reservoirs currently used to flush saltwater from the channel during periods of low flow. These could include more stable water levels in the lake, which in turn would result in higher productivity of the lake fisheries and increased value of the lake as a recreational resource.

Constructing the proposed Brazos Saltwater Barrier would require several state and federal permits. The project would require a Section 404\Section 10 permit from the U.S. Army Corps of Engineers, most likely an individual permit as opposed to one of the Nationwide Permits. If a bridge or other obstruction to navigation would result from the project, a Section 9 bridge permit from the U. S. Coast Guard would be required. Additionally, a Section 401 water quality certification would be required from the Texas Commission on Environmental Quality (as part of the Section 4040 permit). A Texas Pollution Discharge Elimination System general permit for construction would require submittal of a Notice of Intent and development of a Storm Water Pollution Prevention Plan (with monitoring of the construction site). If substantial materials are excavated from the River, a Sand, Marl and Gravel permit must be obtained from the Texas Parks and Wildlife Department and any structures placed in a tidal water of the State of Texas must be granted an easement from the Texas General Land Office unless exempted by law. Many of these permit actions would require secondary reviews, such as archeological and threatened and endangered species investigations of the project site.

Conceptual Design for Pipeline

Another possible solution to consider would be construction of a pipeline and booster pump station to convey Dow and BWA water directly from Harris Reservoir to Brazoria Reservoir without utilizing Oyster Creek. This will maintain water quality to so that treatment costs would be reduced. A 64-inch diameter pipeline would be needed to carry the total yield of both Dow and BWA permitted water rights. A conceptual alignment was chosen to estimate length of pipe (Figure 10). This is discussed as Option C, below.

Figure 10
Conceptual Pipeline Alignment



Economic Overview

To assess the economic viability of this project some comparative analysis was performed between various alternatives. Costs presented in the 2006 RWP are scaled to September 2008. Alternatives examined include:

- Option A1: Construction of a permanent saltwater barrier downstream of Brazoria Pump Station
    - A preliminary estimate has been prepared for construction of concrete saltwater barrier with a gated structure for pleasure craft navigability as summarized in Table 2.

- Option A2: Construction of a permanent saltwater barrier downstream of Harris Pump Station
    - A detailed estimate cannot be prepared at this time without accurate bathymetric data. The available data indicates bathymetry similar to the Brazoria site, so an equal cost capital cost was assumed.

Table 2
Preliminary Cost Estimate for Brazos River Salt Water Barrier downstream of Brazoria Pump Station

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 26,724,000	$ 26,724,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 10,956,840	$ 10,956,840
3	LAND & EASEMENTS	1	LS	$ 655,000	$ 655,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 1,310,000	$ 1,310,000
5	INTEREST DURING CONSTRUCTION	1	LS	$4,824,899	$ 4,824,899
	PROJECT COST				$ 44,470,739

- Option B: Continue pumping from the Harris pump station when the Brazoria pump station is affected by the saltwater wedge.
    - Based on historical records the Brazoria pump station can be used in two-thirds of all circumstances as the Brazos stream flow is sufficient to contain the saltwater wedge downstream of the Brazoria pump station.
    - The Harris pump station will be used for the remaining third. Note that even though this is based upon historical flows as water users in the upper Brazos use more of their allocation in future years, it is expected that future years may have smaller flows generally in the Lower Brazos and therefore the Harris pump Station may need to be used more often. This has not been included in this option as it is based purely on historical data.
    - During periods when the Harris pump station is used (one third of the time) there are additional operating costs for the Lake Jackson pump station.
    - Both Dow Chemical and Brazosport Water Authority (BWA) are assumed to use their full water right allocation. This may be conservative as these entities may not use their entire allocation within any given year.
    - During periods when the Harris pump station is used there are also additional cost associated with the treatment for the full municipal water right for BWA (45,000 acft/yr). An estimated differential cost of $0.15 /1000gal was estimated based upon previous indirect reuse studies in the 2006 RWP. As noted earlier in this report the majority of this additional cost is associated with the additional filtration needed

however there may also be additional cost for pathogen controls but this is not anticipated to be a significant portion of the allocated $0.15 /1000gal cost.

- Option C: Construct a pipeline to avoid using the bed and banks of Oyster Creek and increased treatment cost.
    - o Based on full use of the Dow Chemical and Brazosport Water Authority (BWA) water rights, a 64-inch pipeline is required.
    - o The pipeline, booster pump station, and right-of-way acquisition cost is significant (see Table 3)
    - o As noted earlier in this report, the majority of this additional cost associated with the Harris Reservoir is for additional filtration. The cost of a new pipeline exceeds the additional treatment cost.

Table 3
Preliminary Cost Estimate for 64-Inch Diameter Pipeline and Pump Station

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 55,544,000	$ 55,544,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 22,794,000	$ 22,794,000
3	LAND & EASEMENTS	1	LS	$ 26,200	$ 26,200
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 7,205,000	$ 7,205,000
5	INTEREST DURING CONSTRUCTION	1	LS	$10,413,772	$ 10,413,772
	PROJECT COST				**$ 95,982,972**

- Option D: Comparison of the economics of releasing stored water to hold the salt wedge below the Brazoria pump station.
    - o Currently historical data suggests that the stream flow is sufficient to contain the salt water wedge below the Brazoria pump time in two thirds of all cases. This corresponds to a required flow rate at the Rosharon gauge of 1750 cfs. Based on historical data the 25 percentile stream flow at the Rosharon gauge is 1340 cfs. It is proposed to release water in the upper Brazos when the flow is greater than 1340 cfs but less than 1750 cfs. The net result of this is that the Brazoria pump station can be used more often thereby reducing additional pumping and treatment costs.
    - o The BRA requires payment for this released water at the BRA system rate. This is assumed to be the cost of released water.

Analysis from the 2006 RWP indicated that the additional annual operating cost associated with using the Harris pump station when the Brazos pump station is affected by the salt wedge would be less than the construction cost of a barrier, based on a similar saltwater barrier was constructed in the Neches River which is estimated at $53 million, which was considered when preparing the estimate. It is significantly greater than the current alternative of using the Harris pump station when the Brazoria pump station is affected by the saltwater wedge. The option of releasing stored water from the upper Brazos was significantly more expensive due to the cost of the water released and therefore was not considered further as part of this study. The option of constructing a pipeline to avoid the bed and banks of Oyster Creek to reduce treatment cost is the most costly option. However, the pipeline is sized for the carrying the entire yield of both the Dow and BWA water rights. Whereas the additional cost of pumping and treatment discussed in Option D was only for the amount of the municipal water right.

Conclusion

As is evident from the analysis, it is not economical at this time to install a salt water barrier. However, as upstream water use increases, less water will be available to push the salt wedge below the preferred Brazoria pump station and therefore increase the frequency of pumping from the Harris pump station. This will change the economic picture and it is projected that by the 2020 decade, as population growth and the Fort Bend Subsidence District rules result in greater water use from the Brazos River, the economic break even point will be reached. It will then be economical to install the salt water barrier downstream of the Brazoria pump station. The lead time for such a project is significant given the permit, environmental, design, engineering and construction requirements for a project of this size and sensitivity. Therefore planning and preliminary design work for the project should be undertaken in the near-term for the project to come online as a need arises.

References:

Analysis of Instream Flows for the Lower Brazos River - Hydrology, Hydraulics, and Fish Habitat Utilization, Tim Osting, Ray Mathews and Barney Austin, Surface Water Resources Division, Texas Water Development Board, June 2004

Development of a Cell-Based Streamflow Routing Model (Masters Thesis), Rajeev Raina, Texas A&M University, May 2004

Engineer Manual 1110-2-2602, Planning and Design of Navigation Locks, U.S. Army Corps of Engineers, September 1995

Engineer Manual 1110-2-2607, Planning and Design of Navigation Dams, U.S. Army Corps of Engineers, July 1995

Flood Insurance Study, Brazoria County, Texas, Federal Emergency Management Agency, June 1989, with supporting model information provided by FEMA

Principles of Surface Water Quality Modeling and Control, Robert A. Thomann and John A. Mueller, 1987, Chapter 3 – Estuaries, Bays and Harbors

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Freeport Seawater Desalination Project[1]

DATE: April 20, 2005

SUMMARY

STRATEGY DESCRIPTION: Desalination of seawater for municipal use therefore enhancing flows for irrigation and manufacturing uses in the lower Brazos River basin.

SUPPLY QUANTITY: [Max 100mgd]	11,200 ac-ft/yr (10 mgd) – 33,600 ac-ft/yr (30 mgd)
SUPPLY SOURCE:	Gulf of Mexico Seawater
TOTAL STRATEGY COST[2]:	$976,952,150 to $1,257,220,100
TOTAL CAPITAL COST[3]:	$85,233,000 (11,200AF) - $255,699,000 (33,600AF) (Costs rounded to nearest $100)
UNIT WATER COST:	$1,730 to $2,376 per acre-foot (Average unit cost for desalinated water in the years 2010 – 2060 for Options 5 and 1, respectively)

WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION

INTRODUCTION

The purpose of this analysis is to address the potential use of desalinated seawater to meet projected water shortages in Region H. This study investigates desalinated seawater to supplement existing and future water supplies that currently serve municipal demands within the lower Brazos River basin.

Since the incorporation of this strategy into the 2006 RWP, events have unfolded that have set back the schedule for project implementation. The project sponsor, Poseidon, is no longer involved in the project and Dow is not currently pursuing this as an alternative source for water. Although there are several hindrances to the development of the project at this point, the alternative of seawater desalination remains a viable and technically achievable option for water supply throughout the course of the length of the planning horizon.

ANALYSIS

Desalination is a process that can be used to obtain potable water from water containing high amounts of salts or other solids. This process has been incorporated into several public and

[1] This memorandum was prepared using information in the *Freeport Seawater Desalination Project Final Report* prepared by CDM for the Brazos River Authority.

[2] All costs from the Freeport Seawater Desalination Project Final Report have been adjusted from 2006 RWP value to September 2008 value using the Engineering News Record Construction Cost Index, as recommended in TWDB Exhibit B. The total strategy costs are presented in net present value and include costs associated with delivering desalinated water, current and future surface water supplies, administrative fees, and debt defeasance. Groundwater costs are not reflected in the total strategy costs.

[3] The Capital costs were extrapolated from the Texas Water Development Board Report – The Future of Desalination in Texas (Volume 1) Biennial Report on Seawater Desalination dated December 2004. The costs were assumed to be linear with the expansion of the plant.

private water supplies throughout the state. Several small desalination operations are currently used in Brazoria County.

This water management strategy is a review of the Freeport Seawater Desalination Project proposed as a public-private partnership between the Brazos River Authority (BRA) and Poseidon Resources. The preliminary planning for this project was funded through a $500,000 TWDB grant that was awarded for three proposed desalination projects in Freeport (Region H), Brownsville (Region M), and Corpus Christi (Region N). Of these three projects, the Freeport desalination project was recognized by the TWDB in the December 2002 *Report of Recommendations* to Gov. Perry as the most feasible of the three projects at this time.

Despite historically high operating costs, seawater desalination holds several advantages for Region H, including:

- A drought-proof water supply from a constant supply source.
- Provides a high quality water supply that surpasses most drinking water standards and can support industrial applications requiring very stringent water quality standards.
- Provides a diverse solution for providing water resources to customers as an alternative to typical groundwater and surface water sources.
- Reduces demand for raw surface water that can be used to meet industrial needs that require only low or no quality levels.

A desalination facility located in Freeport would allow desalinated water to be supplied to such wholesale water providers as the Brazosport Water Authority (BWA) and/or the Gulf Coast Water Authority (GCWA). These wholesale water providers (WWPs) would then be able to replace or augment their supplies with a reliable, high-quality water supply from an alternative source that would reduce water-quality issues that have been encountered in the past. Additionally, current BWA and GCWA surface water sources, diversion rights from the Brazos River, could be contracted to provide for industrial raw water demands rather than for use to meet municipal shortages. The proposed service area for the Freeport seawater desalination plant is shown in *Figure 1*.

Table 1 describes five scenarios that were examined for implementing desalinated seawater as a strategy in the Freeport area. In Option 1, desalinated water would be used only to a minimal degree in order to meet water shortages. In Option 2, BWA’s current supplies would be replaced with desalinated water and additional capacity would be diverted for use in the northern portion of Brazoria County and Fort Bend County to meet shortages. In Option 3, GCWA supplies to Missouri City, Pearland, and Sugar Land would be replaced with desalinated water and the resulting surplus could be reallocated to meet other needs in the GCWA service area. Option 4 would replace the GCWA supplies described in Option 3 as well as all supplies to BWA. Finally, a hybrid alternative of Option 2 was created to provide for a constant initial demand while still meeting shortages in the upper portion of the study area. This alternative, Option 5, would immediately replace BWA supplies in their entirety and allow for delivery of desalinated seawater to customers in northern Brazoria County and Fort Bend County when significant shortages begin to develop in 2025.

Table 1
Comparison of Desalination Alternatives

		BRAZOSPORT WATER AUTHORITY (BWA)	
		Use BWA Surface Water to Maximum Capacity	Provide Desalinated Water to BWA Customers for Wholesale Distribution to Customers
GULF COAST WATER AUTHORITY (GCWA)	Use GCWA Surface Water to Maximum Capacity	***Option 1*** Desalinated water used to meet deficits only.	BWA discontinues using its Brazos River surface water supply. ***Option 2*** Desalinated water is supplied to BWA in lieu of using existing surface water. ***Option 5*** Same as Option 2, except infrastructure to convey water to northern part of study area is not constructed in 2025.
	Provide Desalinated Water in Lieu of Raw GCWA Surface Water	***Option 3*** WCID 2 and cities of Missouri City, Pearland, and Sugar Land allow their GCWA option contracts for raw surface water to expire, replacing this supply with desalinated water.	***Option 4*** Desalinated water replaces both BWA and GCWA surface water supplies.

All of the proposed strategies described above call for a 10 MGD reverse osmosis (RO) treatment facility within the Dow Chemical Company complex in Freeport with capability to scale to as much as 100 MGD by the year 2060, depending upon the strategy option chosen. Currently, Dow is not interested in sponsoring a desalination WMS in the near term. The proposed location of the project benefits the project in several ways that include, but are not limited to:

- Pre-existing infrastructure for supporting large-scale industrial processes to reduce costs and expedite project implementation.
- Access to saline and fresh water sources and discharge points.
- Pre-existing permits for withdrawal and discharge.
- Discharge directly into the Gulf of Mexico and fewer environmental concerns than a system discharging into a bay system.

The proposed facility location allows access to an existing seawater intake, A801, located across from the port of Freeport or raw water from the Brazos River. Brine created from the desalination process with a solids concentration nearly twice that of incoming seawater, would be discharged from the site at outfall No. 001 where it will be diluted and discharged into the Brazos River and, ultimately, the Gulf of Mexico.

The proposed plant processes are described in the following sentences. Pretreatment will be performed by means of high-rate sedimentation, filtration, and chlorination and pH adjustment to reduce impacts on process equipment, incoming seawater will be fed to 8-inch diameter, high rejection seawater membrane elements. Post-processing of the water will include stabilization to make the treated water non-aggressive to the distribution system and provide residual chlorination for disinfection. Fresh water from the Brazos River could be blended with desalinated water to maximize the economic efficiency of the plant.

The distribution system recommended by the Freeport Seawater Desalination Project is shown in *Figure 2* and proposes the incorporation of desalinated water into the BWA supply system as well as new conveyance facilities for delivery outside of the BWA service area. This will include transmission along the approximately 45-mile segment between the Freeport plant and the distribution system in northern Brazoria County. Several of these lines will be constructed in parallel to allow for additional capacity as demands require. The total lengths of pipe required for the aforementioned alternatives range from 110 to 140 miles and vary according to the capacity required by the desalination alternative used. This treated water could be introduced directly to the water distribution systems of the customers without further treatment as would be needed for the GCWA raw water supplies currently available to Fort Bend County WCID Number 2, Missouri City, Pearland, and Sugar Land. A blending analysis demonstrated that water from the Freeport plant would be compatible for use in the water systems of Missouri city, the Brazosport Area, and Pearland for the proposed blending levels of all of the alternatives considered, facilitating use throughout the proposed service area.

The possible scenarios for implementing a seawater desalination facility as a management strategy were examined with the future water demands of the service area in mind. The water demand projections for the majority of WUGs in the potential service area were acquired from the approved population and water demand projections published by TWDB for use in the 2006 Regional Water Plans and are consistent with the values presented in *Chapter 2 – Presentation of Population and Water Demands*. However, due to inconsistencies between the TWDB projections and information provide by the Houston-Galveston Area Council (HGAC) and the cities of Lake Jackson and Pearland, the population and water demands used for evaluating each desalination alternative were adjusted for Lake Jackson, Pearland, and County-Other WUGs in both Brazoria and Fort Bend counties. This method of computing population growth and demands also addressed the issue of the expected annexation of several MUDs and the urbanization of unincorporated land surrounding the larger cities.

Costs were estimated from the amount of water desalinated and distributed for each of these scenarios. The costs and the total amount of desalinated water delivered through the 2060 planning period for each of the seawater desalination alternatives are shown in *Table 2* and include debt defeasance for pre-existing infrastructure improvements conducted by the WWPs. Additionally, Option 5 was considered for further study and a rate analysis. This was conducted for each region of the service area and is shown in *Table 3*. Additional detail regarding the development of the project costs included in *Tables 2* and *3* of this technical memorandum are provided in the *Freeport Seawater Desalination Project Final Report* dated November 1, 2004 and prepared by CDM.

Table 2
Summary of Net Present Value Analyses[4]

Option	Net Cost (Adjusted to 2nd Quarter, 2002)					Total Desalianted Water Delivered - 2010 to 2060 (acre-feet)
	Total Net Present Value	Desalinated Water Treatment	Desalinated Water Conveyance	Other Water Sources	Other Costs	
1	$745,765,098	$302,626,451	$141,945,940	$273,121,116	$28,071,591	1,005,763
2	$766,547,117	$330,369,365	$146,088,912	$254,771,910	$35,316,930	1,099,079
3	$924,743,321	$607,221,224	$285,968,573	$18,349,206	$13,204,318	3,076,765
4	$959,710,098	$641,736,864	$297,362,209	$0	$20,611,025	3,167,928
5	$722,112,798	$292,184,503	$123,001,896	$271,790,586	$35,135,813	1,051,614

Table 3
Rate Analysis of Blended Water for Option 5

Year	Water Rate (Adjusted to 2nd Quarter, 2002)		
	Pearland	Ft. Bend County	BWA
2010	$0.65	$0.45	$3.02
2020	$0.85	$0.79	$2.79
2030	$0.91	$1.45	$3.34
2040	$1.04	$1.38	$2.91
2050	$0.88	$1.38	$3.40
2060	$0.96	$1.13	$2.12

[4] Costs include expenses for surface water sources utilized in the desalination alternatives (i.e. cost of GCWA and BWA surface water). Groundwater usage was the same for each option. Therefore, the cost of groundwater is not reflected.

WATER USER GROUP APPLICATION

The desalinated seawater would be used to meet municipal demands in the lower Brazos River basin of Brazoria County, therefore enhancing flows for irrigation and manufacturing WUGs in the lower Brazos River basin that are served by the Chocolate Bayou Water Company and the Dow canal system.

ISSUES AND CONSIDERATIONS

The most important factor in the success of a desalination facility in Freeport is the participation of the local WWPs in such a program. Currently, BWA is expected to have an adequate water supply to continue to meet the needs of its customers from Brazos River diversions and does not have a pressing need to explore additional sources of water. In addition, other, more conventional and lower cost alternative strategies exist to meet water deficits for GCWA. Without financial benefit and an immediate need for expanding alternative resources, BWA and GCWA would likely not participate in the Freeport project. For these reasons, it is imperative that final costs for water are developed through the implementation of a pilot plant and proper funding is secured from state and federal entities to subsidize the desalination program.

Permit requirements for the implementation of the project are expected to be minimal, as the facility is located within the Dow industrial complex. This location will minimize further impacts on threatened and endangered species, wetlands, and other environmental factors. Existing Dow permits for seawater withdrawals may be amended to allow for the plant's operation. Also, pipe alignments are expected to follow existing pipelines whenever possible, minimizing environmental issues along these rights-of-way. Waste-stream discharge, though occurring through the existing Dow discharge canal system, will require a separate TPDES discharge permit.

Figure 1
Proposed Service Area

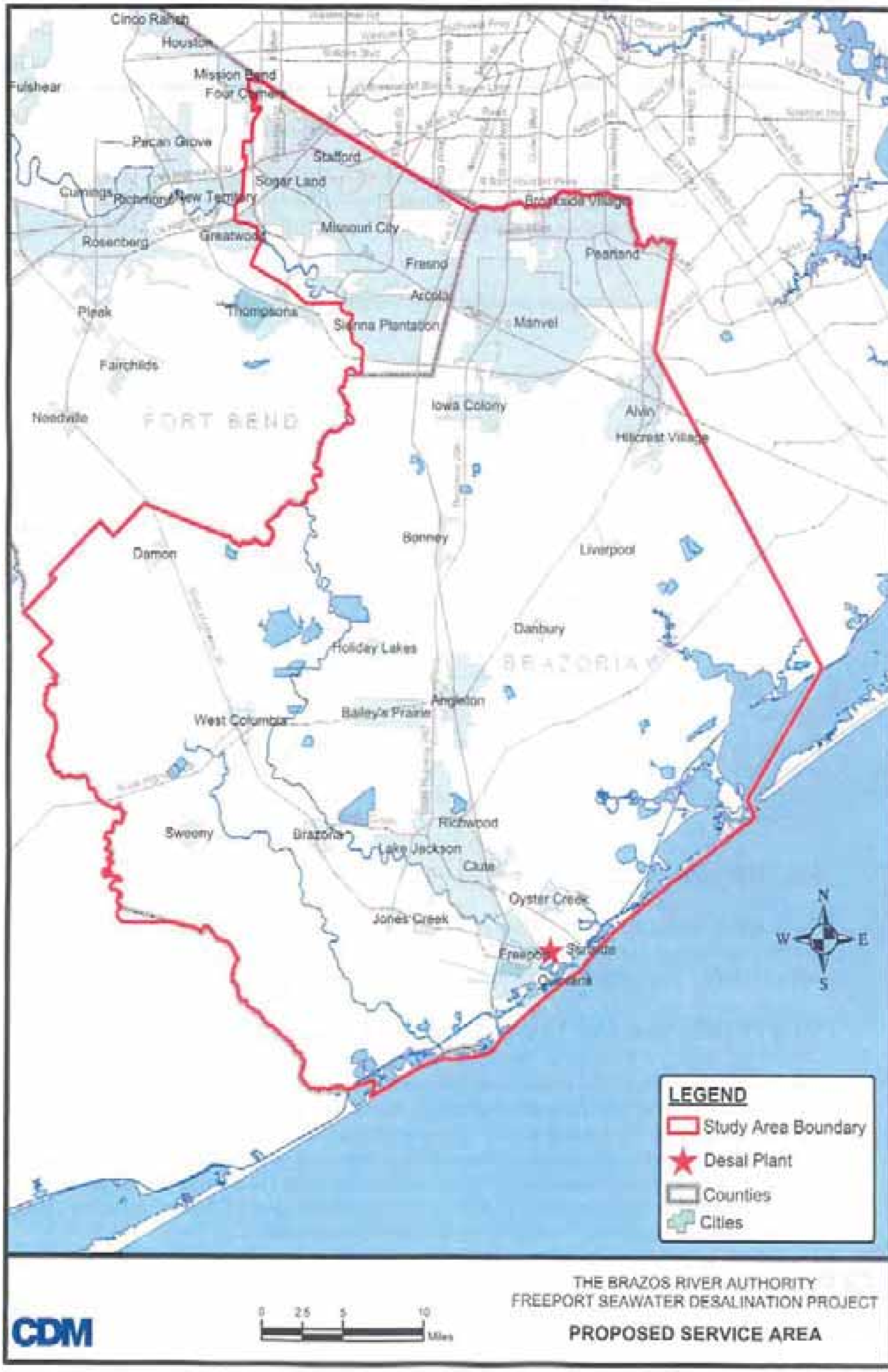
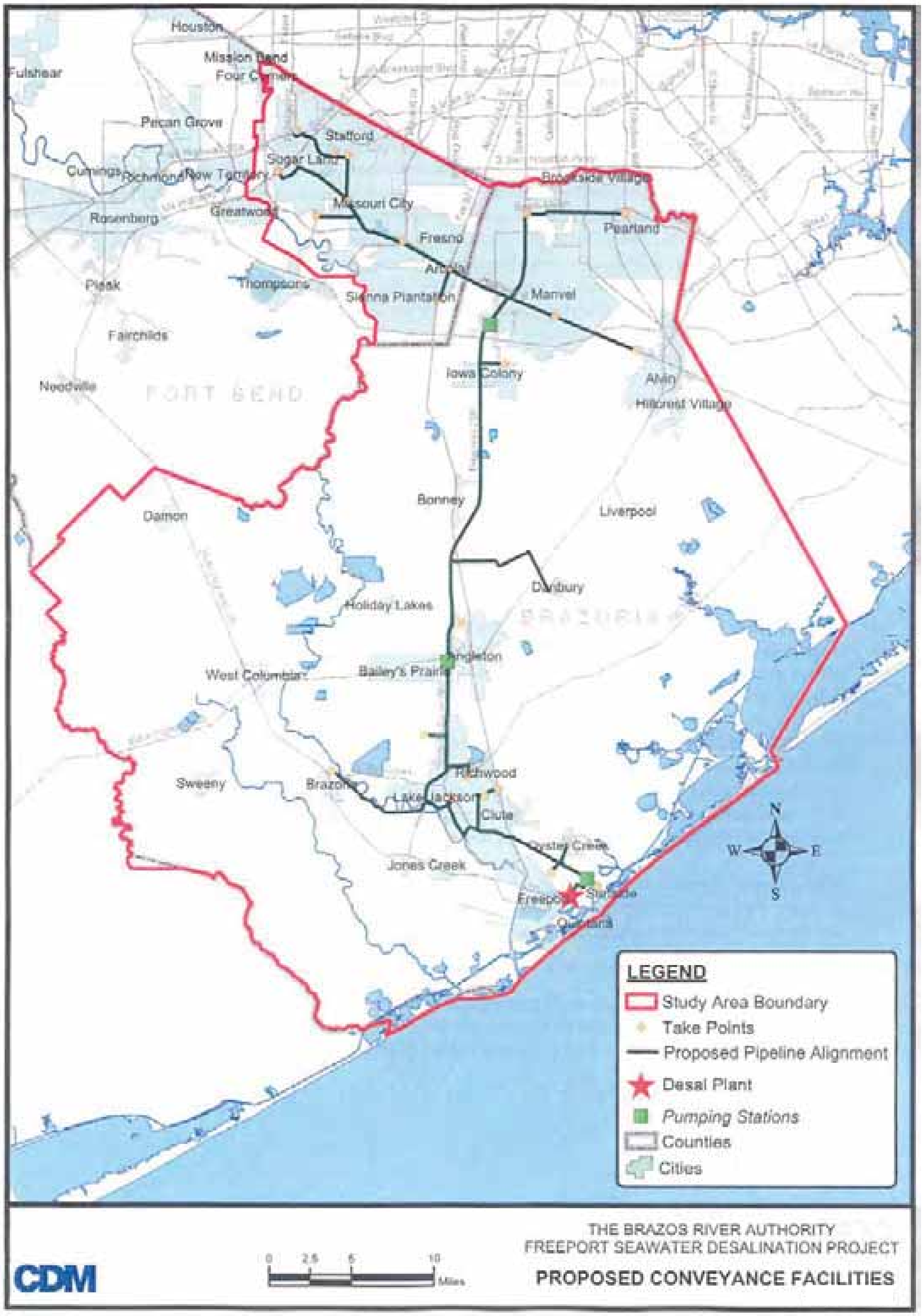


Figure 2
Proposed Conveyance Facilities



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Huntsville Surface Water Treatment Plant Expansion

DATE: January 3, 2010

SUMMARY

STRATEGY DESCRIPTION: Improvement to water treatment facilities for the City of Huntsville.

SUPPLY QUANTITY: 22,400 ac-ft per year (20 mgd of capacity) at ultimate phase

SUPPLY SOURCE: Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $61,023,900 capital cost (estimated using Region H standard cost assumptions). (Costs rounded to nearest $100)

UNIT WATER COST: $587 per acre-foot, based on assumption above.

Water Management Strategy Analysis Description

Introduction:

The City of Huntsville has recently contracted with the Trinity River Authority to increase their current surface water contract from 10 to 20 MGD of supply. In order to utilize this entire contract, the existing surface water treatment facilities that serve the city and surrounding customers will have to be upgraded to a greater capacity.

Analysis:

Costs for additional plant capacity were developed from Region H planning criteria.

Water User Group Application:

City of Huntsville and surrounding areas that are served by the regional system.

Issues and Considerations:

Plant upgrades will have to be implemented as demands increase over the planning horizon. Current projections by TWDB do not capture this level of demand within the planning period.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Montgomery County MUDs 8 and 9 Brackish Groundwater Desalination

DATE: December 14, 2009

SUMMARY

STRATEGY DESCRIPTION: Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.

SUPPLY QUANTITY:	Up to 2,240 acre-feet per year (average 2.0 MGD)
SUPPLY SOURCE:	Brackish groundwater from the Gulf Coast Aquifer
IMPLEMENTATION DECADE:	2010 (2014) – All water treatment and distribution infrastructure.
TOTAL CAPITAL COST:	$12,000,000
UNIT WATER COST:	$1,171 per acre-foot average annual unit water cost for years 2010-2060

Water Management Strategy Analysis Description

Introduction:

The Lone Star Groundwater Conservation District (LSGCD) has mandated a county-wide reduction in groundwater pumping, limiting groundwater to 70 percent of total county demands, to be met by 2016. A preliminary evaluation of existing groundwater data conducted by the MUDs concluded that a suitable quantity and quality of water exists in the study area in three sand zones ranging from 1,700 to 2,800 feet below msl in depth. Water quality in each of these potential production zones is estimated to be brackish (1,000 to 5,000 milligrams per liter [mg/L] Total Dissolved Solids [TDS]) within the study area. LSGCD has defined acceptable “Alternative Water Sources” to include brackish groundwater produced from geologic formations underlying the Gulf Coast Aquifer, but only to the extent that any such production will not threaten the quality or the quantity of fresh water supplies within the Gulf Coast Aquifer within the District, and to the extent that such production does not cause subsidence within the District.

Analysis:

Montgomery County MUDs 8 and 9 have commissioned a study of the engineering and permitting feasibility of developing and treating this brackish groundwater as an alternate means meet the mandated groundwater reduction. Based on current LSGCD regulations, the MUDs combined groundwater pumping limit (70% of the total permitted pumping amount in 2009) will be approximately 1.16 MGD beginning in 2016. Based on projected demands, the MUDs’ maximum unmet demand, or conversion requirement, would begin in 2016 at 0.61 MGD and reaches a maximum of 1.55 MGD in 2035 and after. Therefore, a brackish desalination facility of 2.0 MGD capacity is presently envisioned. If determined feasible, the ongoing analysis will also estimate the implementation and operational costs of such a project.

Water User Group Application:

Treated water would meet shortages for the Montgomery County MUD 8 and 9 WUGs and increase the amount of ground-water derived return flow to Lake Conroe.

Issues and Considerations:

The key permitting consideration is concentrate disposal. TCEQ has undergone rulemaking to develop a general permit for injection wells for reverse osmosis (RO) concentrate disposal, which is now under consideration by the Commission. There is precedent for both surface and injection well disposal of RO concentrate in Texas (over 30 facilities with capacity greater than 0.25 MGD). A second regulatory consideration is whether the target aquifers meet the LSGCD regulations conditions for an alternative water supply. Finally, the estimated costs to develop and operate such a project must be determined feasible. All three of these considerations are included in the current scope of study commissioned by the MUDs.

References:

Texas Water Development Board. 2006. A Desalination Database for Texas. Revised October 2006. Prepared by Jean-Philippe Nicot, Steven Walden, Lauren Greenlee, and John Els. Texas Water Development Board, Austin, Texas.
www.twdb.state.tx.us/RWPG/rpgm_rpts/2004483021_Desal_Database_Texas_Rev.pdf.

R.W. Beck, Inc. 2004. Guidance Manual for Permitting Requirements in Texas for Desalination Facilities Using Reverse Osmosis Processes. Prepared for the Texas Water Development Board by R.W. Beck, Inc.
www.twdb.state.tx.us/RWPG/rpgm_rpts/2003483509.pdf.

LSGCD Regulations.
http://www.lonestargcd.org/

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: East Texas Water Transfer

DATE: January 3, 2010

SUMMARY

STRATEGY DESCRIPTION: Transfer surplus raw water supplies in the Sabine and/or Neches Basin to serve WUGs in Harris and Montgomery Counties.

SUPPLY QUANTITY: Maximum availability 26,762 acre-feet per year in 2020, increasing to 486,500 acre-feet per year by 2060

SUPPLY SOURCE: Sabine and/or Neches Rivers

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $760,813,300 capital cost (Costs rounded to nearest $100)

UNIT WATER COST: Dependent on volume that would be allocated if selected as an an alternative.

Water Management Strategy Analysis Description

Introduction

By 2020, significant shortages will appear within Montgomery County that can not be met by existing strategies. Additionally, Harris County will experience major shortages in the 2030 decade. This strategy evaluates importation of water from the Sabine and/or Neches River Basins to meet the projected shortfalls. Water will either be pumped from the Sabine River above Orange and conveyed via Sabine River Authority (SRA) canals to the Lower Neches Valley Authority (LNVA) canal system at the LNVA First Lift Pumping Station north of Beaumont or pumped from the Neches River to the LNVA canal systems. LNVA canals will carry the flow west and discharge it into the Trinity River where it can be diverted for use by water providers in the lower Trinity basin. Where possible, existing pumping stations and canals belonging to the SRA and the LNVA will be expanded to carry the additional flows. New canals, pumping stations and pipelines will be constructed where it is not feasible to use existing facilities. Attached Figure 1 shows the pumping stations, pipelines and canals needed to transport water from the Sabine and Neches River to the Trinity River.

With East Texas water supplies to replenish the lower Trinity water, additional withdrawals of Trinity water can be made from Lake Livingston. An integral part of this strategy is a pipeline from Lake Livingston discharging into the West Fork of the San Jacinto River (see Figure 1). This segment ultimately flows into Lake Conroe and then diverted to meet demands throughout the San Jacinto River basin.

Analysis

Table 1 shows the projected shortfall in water supply for the Harris and Montgomery Counties. The Montgomery County shortages developing in 2020 will require the implementation of a significant water management strategy. In 2030, increasing Montgomery County shortages along with Harris County shortages will create a combined deficit of over 100,000 acre-feet per year. Ultimately, as much as 486,000 acre-feet per year of East Texas water will be required to meet shortages. Sufficient supplies of water exist in the Sabine and Neches River watersheds to satisfy all of these demands.

Physical facilities required by this strategy include the following:

- Pumping stations, canals and pipelines to convey Sabine River water to the Neches basin
- Pumping stations and canals to convey Sabine water across the Neches basin into the lower Trinity River
- Pumping stations and pipeline to convey water from Lake Livingston to the San Jacinto basin

Facilities were sized to account for canal losses (assumed to be 85 acre-feet per year per canal-mile) plus 20% for seasonal variations. Losses from the Trinity River and San Jacinto River discharge points to the receiving WWPs have not been included but will require consideration once the take points for those WWPs have been determined.

Sabine-to-Neches Segment: Sabine River water will be pumped from the river at a new pumping station adjacent to the SRA existing river intake. Water will be routed through upgraded SRA canals west to a new pumping station just north of I-10. A new canal will transport water west from this pumping station. A pipeline will carry the flow under the Neches River and deliver the water to the forebay of the LNVA First Lift Pumping Station. These facilities will be needed by 2030 and are estimated to cost $ 293,427,000. Including losses and seasonal peaks, these facilities are sized to deliver 525 mgd to the LNVA pumping station.

Neches-to-Trinity Segment: The existing pumping stations on the LNVA Main Canal have sufficient capacities to carry the added trans-basin flow. Minor upgrades to the Main Canal will be required. A new pumping station will be constructed on the Main Canal near its junction with the Nolte Canal. This facility will pump trans-basin flows into a new canal extending west to a discharge point on the Trinity River. These facilities will be needed by 2030 and are estimated to cost $ 148,403,400. Including losses and seasonal peaks, these facilities are sized to deliver 521 mgd to the lower Trinity River.

Lake Livingston-to-San Jacinto Segment: All facilities in this segment will be new. A pump station with a lake intake located on the western shore of Lake Livingston near the town of Pointblank will pump the flows required in Montgomery County through a 96-in. pipeline to a booster pump station located west of the City of Huntsville. At this point, water will be discharged into the West Fork of the San Jacinto River and will flow into Lake Conroe. These facilities will be needed beginning in 2020 and are sized to deliver 155 mgd. Costs are estimated at $318,982,800.

A transfer of SRA water would require the use of all three segments and would have a total project cost of $760,813,320. Annual costs would range from $32.6 million in to $98.9 million.

It should be noted that these costs do not include the cost of purchasing the water since it is subject to negotiation between the seller (SRA/LNVA) and future buyers. Informal discussions indicate that the pricing of water will be based on "replacement cost" of alternative water supplies. Additionally, this cost includes no estimate for upgrades to existing conveyances required that would deliver Sabine or Neches River water from the Trinity and San Jacinto Rivers to customers. These costs would be considered by the WWPs sponsoring the East Texas transfer strategy. It should be recognized that there is a significant difference within the total project cost of various segments.

Water User Group Application

This strategy transfers raw water from the Sabine and/or Neches Rivers to meet the projected needs of WUGs within Montgomery County experiencing shortages in 2020 and Harris County WUGs in 2030.

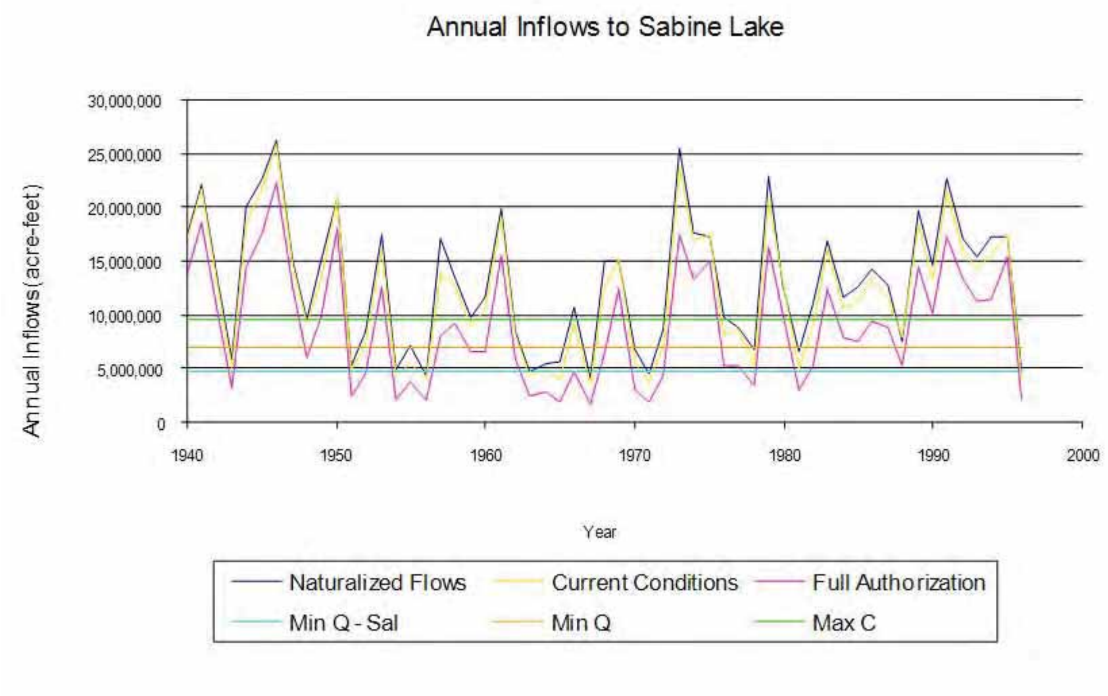
Issues and Considerations

As a result of Senate Bill 1, interbasin transfer water would have water rights junior to other water rights in the basin of origin. Although of concern, this issue may be less relevant in the case of a transfer from the Sabine River below the Toledo Bend Reservoir since the SRA is the only entity owning significant water rights in that segment of the river. This transfer, due to its magnitude, will be perceived as a sensitive management strategy requiring reconciliation of water valuation and other political issues. Valuation issues include the affect of periodic or prolonged low lake levels on property values and recreational revenues in Sabine and Shelby Counties.

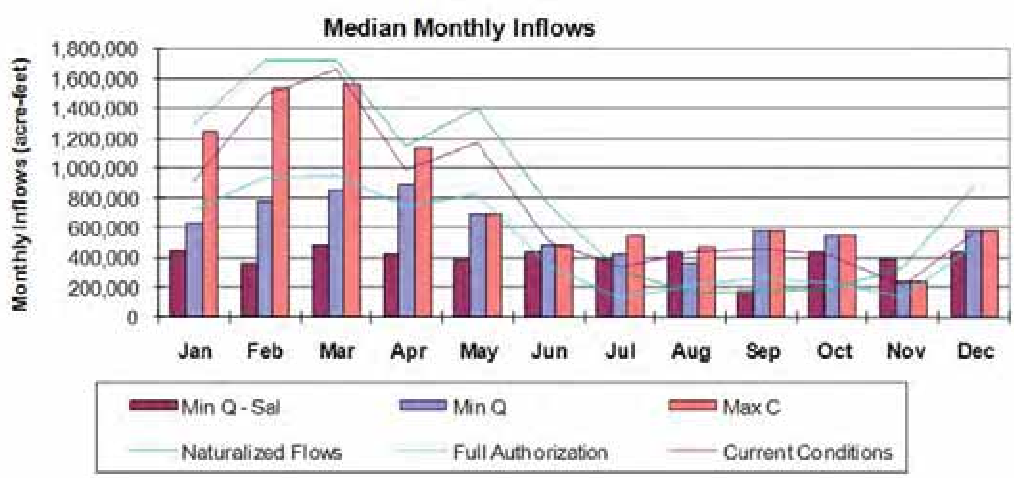
Discussions with representatives of the Region I Planning Group regarding the potential use of East Texas water within Region H occurred in February 2005. The discussions included the coordination of appropriate supply volumes potentially available for transfer to Region H after in-basin needs were fulfilled and in consideration of potential transfers of water to other planning regions including Region C. Further coordination between the Region H and Region I planning groups will be required as this strategy is more fully developed over time. Issues such as environmental impacts and basin of origin compensation will need to be addressed cooperatively by both planning groups to better enable this strategy to be implemented.

The State of Louisiana and local Sabine Lake water interests have historically voiced concern about a large-scale water transfer of the type outlined within this management strategy. This strategy will therefore require further environmental study before the ecological effects can be fully determined. Concerns may also arise regarding the introduction of Sabine and Neches River water into the Trinity basin and Trinity River water from Lake Livingston to the San Jacinto River basin.

The graph below illustrates the annual inflows to Sabine Lake from the Sabine and Neches Basins. The graph also compares inflows values from TCEQ WAM runs 3, 8, and naturalized conditions to target inflows developed by the TWDB and TWPD. The target inflows are Min Qsal, MinQ, and Max C. Min Qsal represents the minimum freshwater inflows to maintain an allowable salinity. MinQ represent the minimum freshwater inflows estimated to maintain a healthy fishery environment. MaxC represents the freshwater inflows at which the estuary production would be maximized.



Median monthly inflow quantities from the Sabine and Neches Rivers developed using naturalized, TCEQ WAM Run 3 and 8 are compared to Sabine Lake inflow targets in the graph below.



Currently, there is approximately 1,500,000 acre-feet per year of water permitted in Toledo Bend Reservoir in the Sabine River basin and approximately 820,000 acre-feet per year of water permitted in Sam Rayburn / Steinhagen Reservoir in the Neches River basin. Based on information in the 2001 Region I Water Plan, it is assumed that of the 820,000 acre-feet of water rights only 210,000 acre-feet per year is available for transfer into Region H. The 820,000 acre-feet per year represents the LNVA permitted supply and does not represent the maximum amount of firm water in Rayburn / Steinhagen Reservoir. Therefore, it was assumed that the remaining amount of supply from the Neches river basin would be comprised of new water rights permits and existing run-of-river water rights. Sabine River Authority of Texas holds approximately 750,000 of water in Toledo Bend Reservoir. Therefore, it was assumed that the full-authorization model (TCEQ WAM Run 3 model) would reflect the transfer of this water out of the river basins because the models do not include return flows. It is assumed that SRA-LA will participate in the transfer of water from Toledo Bend Reservoir. For reference purposes, the percent compliance of the Current Conditions and Naturalized Sabine Lake Inflows are compared in the table below to the Full-Authorization model with respect to estimated monthly inflow targets.

	Percent Compliance of Monthly Inflow Targets		
	Max C	**Min Qsal**	**Min Q**
Naturalized	48	66	56
TCEQ WAM Run 8 - Current Conditions	44	66	54
TCEQ WAM Run 3 - Full Authorization	29	52	38

Information was obtained from WAM Modeling conducted by Turner Collie & Braden Inc., dated 6-23-03.

When reviewing the naturalized flow conditions, the estimated bay and estuary inflow targets are met approximately 48, 66, and 56 percent of the time for Max C, Min Qsal, and Min Q, respectively. The percent inflow target compliance decreases when current water uses and return flows are added into the WAM and further decrease when currently permitted water is completely utilized and no return flows are incorporated into the WAM model. The Sabine Lake Bay and Estuary inflow targets, used to compare the various conditions discussed above, are estimated and not formally adopted by the State as targets. If instream flow requirements are required in the permit amendment process to change water use types and allow interbasin transfers, the amount of this water available for interbasin transfer could decrease. This decrease could potentially make this strategy less desirable due to financial and institutional constraints.

Other Environmental concerns related to construction within the upper West Fork of the San Jacinto River channel may also be an issue. Rectification of some segment of the river may be required. Increased use of stored water from Lake Livingston may result in periodic or prolonged low lake levels, which may adversely impact property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend County W.C. & I.D. No. 2 GRP

DATE: November 23, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Fort Bend County W.C. & I.D. No. 2 Ground Water Reduction Plan (GRP) will reduce ground water use through surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volumes of 2,296 afy in 2013 and 5,753 afy in 2025

SUPPLY SOURCE: GCWA Canal System (Brazos River water)

IMPLEMENTATION DECADE:	30% reduction – 2013
	60% reduction – 2025

TOTAL STRATEGY COST:	$10,631,500 capital cost, Phase I surface water treatment plant
(Costs rounded to nearest $100)	$7,098,700 capital cost, Phase II surface water treatment plant
	$7,098,700 capital cost, Phase III surface water treatment plant

ANNUAL UNIT WATER COST: $353 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

Fort Bend County W.C. & I.D. No. 2 (WCID No. 2) is partnering with Harris County MUD No. 122, Fifth Street Water Supply Corporation, and City of Meadows Place for purposes of meeting the required groundwater reduction. WCID No. 2 has obtained 10.5 MGD of raw water supply from GCWA to meet their conversion.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. WCID No. 2 is partnering in this endeavor with Harris County MUD No. 122, Fifth Street Water Supply Corporation, and City of Meadows Place.

The GRP indicates that a 3 MGD plant will be sufficient to meet 2013 conversion requirements and will delay capital expenditures through over-conversion credits. An additional 3 MGD will be required by 2025, with an additional 3 MGD needed by 2032. WCID No. 2 has contracted with GCWA for 10.5 MGD of raw water supply and has obtained 80 acres of land adjacent to the GCWA canal for treatment plant development. WCID No. 2 is also engaged in water conservation and uses reuse water for internal plant process and cleanup needs.

Water User Group Application:

WCID No. 2 and its partners are starting implementation of this strategy.

Issues and Considerations:

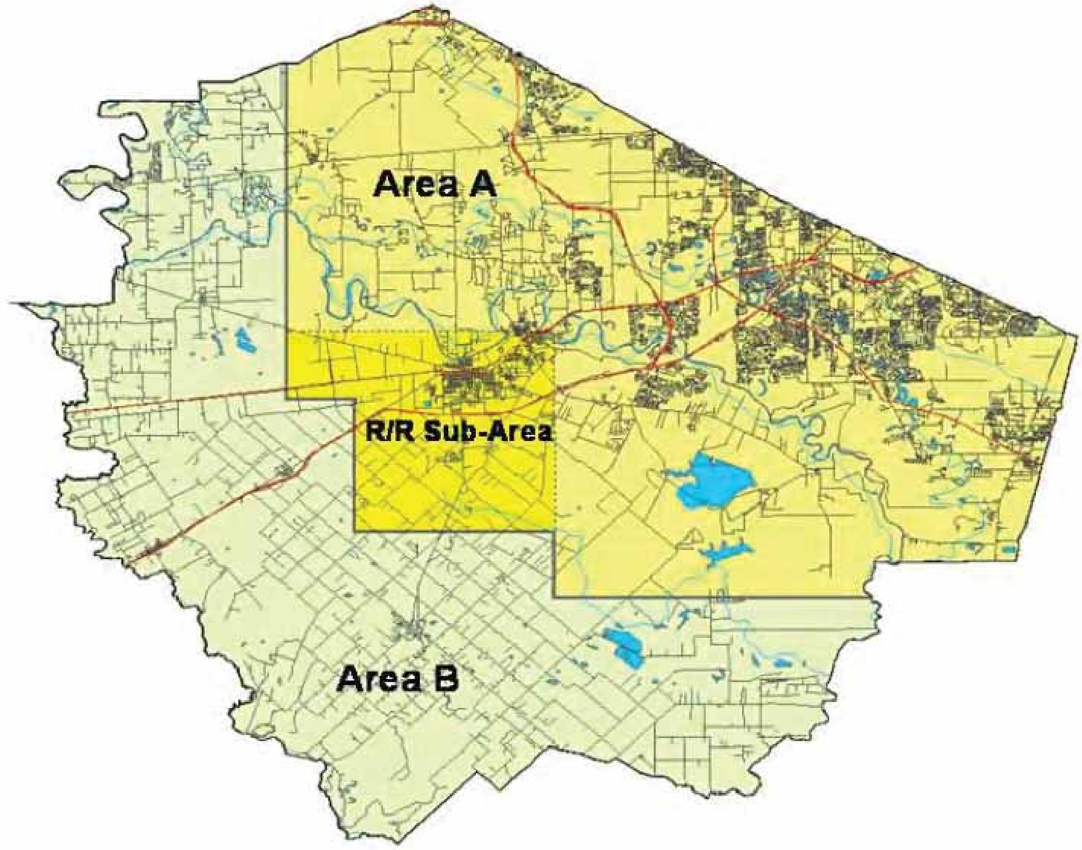
None

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Groundwater Reduction Plan, Fort Bend County W.C. & I.D. No. 2, February 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Little River Off-Channel Reservoir

DATE: December 15, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction on an off-channel reservoir in Milam County in the Brazos Basin

SUPPLY QUANTITY: 27,225 acre-feet per year

SUPPLY SOURCE: Little River, Brazos Basin

IMPLEMENTATION DECADE: 2030 or 2040

TOTAL STRATEGY COST: $137,356,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $436

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Little River Off-Channel Reservoir was studied by the Brazos G Water Planning Group, but not recommended as a water management strategy in the 2001 Brazos G Regional Water Plan. It is an off-channel reservoir located in Milam County near the City of Cameron. The 2001 Brazos G Water Planning Group analysis of this water management strategy was used in the Region H strategy selection process. The current Brazos G analysis is available in the 2011 Brazos G Regional Water Plan, Section 4B.13.5. The yield and cost data in the summary above is provided by the Brazos G Water Planning Group based on updated analysis and modeling. The reservoir yield above reflects inclusion of this project in the BRA System Operations.

Water User Group Application:

This strategy would provide supply to WUGs in the Lower Brazos River Basin, and the adjoining Coastal Basins.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: River Plantation MUD GRP

DATE: July 9, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Additional conversion from existing groundwater supplies to expanded WWTP effluent water usage to irrigate the River Plantation Country Club golf course in order to meet required reductions in groundwater use.

SUPPLY QUANTITY: 168 ac-ft/yr (55 mgy current) – 368 ac-ft/yr (120 mgy)

SUPPLY SOURCE: River Plantation Waste Water Treatment Plan effluent

TOTAL STRATEGY COST: $484,926 capital cost ($221,379 in 2010 and $263,547 in 2020)

UNIT WATER COST: $495 average annual unit water cost

<u>Water Management Strategy Analysis Description</u>

Introduction:

The purpose of this analysis is to incorporate the River Plantation Municipal Utility District (MUD) GRP as a water management strategy in the expansion of water reuse supplies for irrigation. The River Plantation MUD GRP includes two participants: River Plantation MUD and the River Plantation Country Club (RPCC), which is entirely within the MUD. Note that RPCC is not a separate named WUG and hence its demands are included with River Plantation MUD.

Analysis:

Scientific studies conducted by the Lone Star Groundwater Conservation District (LSGCD) have shown that the demand for groundwater in many areas within Montgomery County is exceeding the sustainable yield of the aquifers, and is leading to alarming declines in water level throughout the county. Modeling of future population and water demand has shown that this continued reliance on groundwater would lead to significant problems for water suppliers within the county as well as continued water level decline in aquifers.

In an effort to meet a larger portion of the county's water demand with surface water, allowing for the decrease in use and reliance on groundwater, the LSGCD adopted the District Regulatory Plan (DRP) "to create a regulatory framework for the District to responsibly regulate and conserve the use of groundwater in Montgomery County. The DRP requires Large Volume Groundwater Users (LVGU) to conduct long-term planning in order to assess their future water needs, and to describe how they will obtain alternative water supplies such that future demands can be met whilst adhering to groundwater reduction requirements adopted by the LSGCD. The DRP established an aquifer sustainable yield of 64,000 acre-feet per year, and requires groundwater use to be reduced to this annual volume by January of 2015.

The LVGUs are defined as entities that produce over 10 million gallons per year, but exclude single family residences and agricultural use of water. There are 204 LVGUs in Montgomery

County and include everything from large municipal systems to smaller public and private utilities, as well as individual industries, businesses, golf courses, and homeowner associations.

Water User Group Application:

The River Plantation MUD began conserving groundwater by using WWTP effluent for golf course irrigation needs in 1988. Water demand projections for the MUD show slight decline, due to near build-out conditions and plumbing code savings. The current GRP lays out the planned strategy for meeting the DRP's timeline for the mandated conversion to non-groundwater sources. The MUD is partnering with RPCC to supply them with an additional 200 acre-feet per year of WWTP effluent for irrigation needs. It is estimated that this expansion will be in place to provide additional reuse water beginning by 2020, allowing for the reduction in groundwater used. **Table 1** below presents the population and water demand projections for River Plantation MUD, as well as supplies from treated effluent to irrigation demand (shown as part of total WUG demand).

Table 1
River Plantation Population and Water Demand Projections

	2010	2020	2030	2040	2050	2060
Population	3310	3310	3310	3310	3310	3310
Demand (Acre-Feet/Year)	835	824	812	801	798	798
Reuse Supply for golf course irrigation (Ac-Ft/Yr)	168	368	368	368	368	368

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Dow Off-Channel Reservoir and Pump Station Expansion

DATE: June 4, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The Dow Chemical Company – Texas Operations is considering increasing the total raw water pumping and storage capacity available for use at their industrial plant in Freeport, Texas. Increasing the site's reservoir storage capacity and building a new river intake and pump station would give Dow more flexibility in managing their raw water resources and provide protection during drought conditions, when pumping from the Brazos River is limited or curtailed. This project would firm up existing water rights held by Dow and would be used to meet manufacturing and municipal shortages in Brazoria County The supply quantity indicated is very conservative with respect to the impact on existing and future firm yield. The proposed reservoir is needed to improve reliability of existing firm yield and provide an additional firm yield supply quantity of 21,800 acre-feet/year.

SUPPLY QUANTITY: 21,800 acre-feet/year

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $124,468,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $481 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

The current supply available from Dow's water rights is 137,475 acre-feet per year. During the drought in the summer of 2009, extremely low flows caused Dow to cease pumping from the Brazos River into their raw water storage reservoirs. The construction of a new, larger reservoir will increase reservoir storage by an additional 44,000 acre-feet to establish a 4- to 8-month supply, bridging the driest months of the critical drought and meet more of Dow's current raw water demand. A new raw water intake and pump station, with a pumping capacity of 201,000 gpm, will make efficient use of the additional storage capacity, and allow Dow to achieve a total reliable supply of 220 cubic feet per second (cfs), equivalent to an annual supply of 159,275 acre-feet per year. Construction of the project would therefore provide an additional 21,800 acre-feet per year of supply.

Analysis:

The new reservoir will have a water depth of 25 feet which will necessitate an embankment height of approximately 32 feet. A major underlying assumption of this conceptual-level study is that geologic conditions would be suitable for constructing an earthen embankment. For the new reservoir, a homogeneous embankment with a vertical chimney filter/drain was assumed for cost estimating purposes. The embankment crest would be 6 feet above the conservation storage level. The outlet works system and spillway would be located adjacent to each other and discharge into Oyster Creek.

Water User Group Application:

The supply developed by the project would be used to better meet projected manufacturing and municipal supply shortages in Brazoria County during drought conditions, based on current demand. Historical use from the Dow reservoir systems has been 80% for Dow's benefit and 20% for non-Dow benefit which includes municipal and other industrial. The municipal beneficiaries of Dow's reservoir systems is through Brazosport Water Authority (BWA) which supplies surface water needs for 7 member cities in southern Brazoria County.

Environmental Impact:

While the specific location of the reservoir expansion is not identified, the project would impact approximately 2,000 acres of land, which is likely currently used for agricultural production and grazing.

Although a number of federal and state endangered and threatened species are listed for Brazoria County, the existing disturbed condition of the proposed sites suggests that any impacts to listed species will be moderate to low.

Large changes in nearby property values are not anticipated due to the rural nature of the existing area. Recreational use of the reservoir is anticipated to include fishing and bird watching.

Issues and Considerations:

The development of a project of this nature will require the study and consideration of many issues. These will include, but are not necessarily limited to: TCEQ water rights permitting for additional off-channel storage capacity, U.S. Army Corps of Engineers Section 404 permitting, environmental assessments of the intake and pump station and reservoir sites, Sand, Gravel and Marl permit from the Texas Parks and Wildlife Department, compliance with TCEQ dam safety regulations including reviews and construction approvals, revisions to FEMA floodplain mapping for the Oyster Creek and Brazos River floodplain, utility relocations, new electrical power supply to the pump station site, road relocations, sediment removal (permitting and facility design), Storm Water Pollution Prevention Plans for construction operations, and site security.

Table 1
Off-Channel Reservoir Expansion Cost Summary

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$78,490,000	$ 78,490,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$27,472,000	$ 27,472,000
3	LAND & EASEMENTS & SURVEYING	1	LS	$ 8,100,000	$ 8,100,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 2,000,000	$ 2,000,000
5	INTEREST DURING CONSTRUCTION	1	LS	$ 8,406,000	$ 8,406,000
	PROJECT COST				$ 124,468,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	DEBT SERVICE (Off-Channel Reservoi	$ -	$ 6,753,000	$ 6,753,000	$ 6,753,000	$ 6,753,000	$ 6,753,000
2	DEBT SERVICE (Intake and Pump Static	$ -	$ 1,994,000	$ 1,994,000	$ 1,994,000	$ -	$ -
3	OPERATION & MAINTENANCE (O&M)	$ -	$ 1,340,000	$ 1,340,000	$ 1,340,000	$ 1,340,000	$ 1,340,000
4	PUMPING ENERGY COSTS	$ -	$ 397,000	$ 397,000	$ 397,000	$ 397,000	$ 397,000
5	PURCHASE OF WATER	$ -	$ -	$ -	$ -	$ -	$ -
	TOTAL ANNUAL COST	$ -	$ 10,484,000	$ 10,484,000	$ 10,484,000	$ 8,490,000	$ 8,490,000

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$16,287,000	$ 16,287,000
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$62,203,000	$ 62,203,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ -	$ -
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				$ 78,490,000

Table 1 (cont'd)
Off-Channel Reservoir Expansion Cost Summary

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5%	%	$16,287,000	$ 407,000
2a	PIPELINES	1.0%	%	$ -	$ -
2b	PIPELINE CROSSINGS	1.0%	%	$ -	$ -
3	WATER TREATMENT PLANTS	1	LS	$ -	$ -
4	WATER STORAGE TANKS	1.0%	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1.5%	%	$62,203,000	$ 933,000
6	WELL FIELDS	1.0%	%	$ -	$ -
7	DAMS & RESERVOIRS	2.5%	%	$ -	$ -
8	RELOCATIONS	1.0%	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1.0%	%	$ -	$ -
10	STILLING BASINS	1.0%	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	1.0%	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 1,340,000**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend County Off-Channel Reservoir

DATE: July 15, 2010

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Fort Bend County to divert and hold currently unappropriated flows from the Brazos River. Water would be available to meet demands in Fort Bend County.

SUPPLY QUANTITY: 46,000 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2050

TOTAL CAPITAL COST: $202,514,788

ANNUAL UNIT WATER COST: $1,893 per acre-foot for allocated volume 2050-2060, true cost $947 per acre-foot of firm yield.

Water Management Strategy Analysis Description

Introduction:

There is currently a portion of the flow in the lower Brazos River basin that is not appropriated by existing permits. This water could be used to meet projected needs in the lower basin. However, storage would be required in order to increase the firm yield of these flows. A portion of demands in the lower Brazos River basin could be met using one or more smaller off-channel reservoirs (OCRs). A preliminary analysis was carried out for a potential OCR project in Fort Bend County. Initial results suggest that an 70,000 af-ft OCR with a 200 MGD pump station could create a 46,000 ac-ft/yr firm yield.

Analysis:

The Fort Bend County OCR was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 25 feet and 1:6 sideslope. The resultant project area is estimated as slightly above 3,000 acres. Monthly diversions from the stream were limited to reflect the capacity of a 200 MGD pump station. An additional environmental flow limitation was applied to modeled monthly diversions to represent Consensus Criteria for Environmental Flow Needs (CCEFN). Diversions from the channel to the OCR were only permitted when the flows below the diversion location met the CCEFN target for that month. CCEFN targets were calculated from measured flows at the USGS gauge near Richmond. Model outputs indicated a firm yield of 46,000 acre-feet per year. Costs were developed assuming the reservoir as described with an additional small on-channel weir. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the Fort Bend County OCR would be expected to serve demands (primarily municipal and industrial) in Fort Bend County.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,000 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; industrial and municipal users are the most likely customers for this project as they can support the unit cost and are projected to have needs during the planning period.

Table 1
Fort Bend County Off-Channel Reservoir Cost

Summary Sheet

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 92,129,338	$ 92,129,338
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 32,245,268	$ 32,245,268
3	LAND & EASEMENTS	1	LS	$ 31,193,430	$ 31,193,430
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 24,974,700	$ 24,974,700
5	INTEREST DURING CONSTRUCTION	1	LS	$ 21,972,051	$ 21,972,051
	PROJECT COST				**$ 202,514,788**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ 13,459,444	$ 13,459,444
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ 2,096,820	$ 2,096,820
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ 28,010,422	$ 28,010,422
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ -**	**$ -**	**$ 43,566,686**	**$ 43,566,686**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 20,641,358	$ 20,641,358
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$ 71,386,000	$ 71,386,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ 101,980.00	$ 101,980
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 92,129,338**

Table 1
Fort Bend County Off-Channel Reservoir Cost (continued)

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 20,641,358	$ 309,620
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previo	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$ 71,386,000	$ 1,784,650
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 101,980	$ 2,550
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 2,096,820**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazoria County Off-Channel Reservoir

DATE: July 15, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Brazoria County to divert and hold currently unappropriated flows from the Brazos River. Water would be available to meet demands in Brazoria County.

SUPPLY QUANTITY: 24,000 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2060

TOTAL CAPITAL COST: $173,898,600 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $1,206 per acre-foot allocated in 2060

<u>Water Management Strategy Analysis Description</u>

Introduction:

There is currently a portion of the flow in the lower Brazos River basin that is not appropriated by existing permits. This water could be used to meet projected needs in the lower basin. However, storage would be required in order to increase the firm yield of these flows. A portion of demands in the lower Brazos River basin could be met using one or more smaller off-channel reservoirs (OCRs). A preliminary analysis was carried out for a potential OCR project in Brazoria County. Initial results suggest that a 60,000 ac-ft OCR with a 100 MGD pump station could create a 24,000 ac-ft/yr firm yield.

Analysis:

The Brazoria County OCR was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. Because the Brazoria OCR would likely not be required until 2060, models were carried out with a Fort Bend County OCR already in place. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 20 feet and 1:6 sideslope. The resultant project area is estimated as 3,200 acres. Monthly diversions from the stream were limited to reflect the capacity of a 100 MGD pump station. An additional environmental flow limitation was applied to modeled monthly diversions to represent Consensus Criteria for Environmental Flow Needs (CCEFN). Diversions from the channel to the OCR were only permitted when the flows below the diversion location met the CCEFN target for that month. CCEFN targets were calculated from measured flows at the USGS gauge near Rosharon. Model outputs indicated a firm yield of 24,000 acre-feet per year. Costs were developed assuming the reservoir as described with an additional small on-channel weir. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the Brazoria County OCR would be expected to serve demands (primarily municipal and industrial) in Brazoria County.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,200 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; industrial and municipal users are the most likely customers for this project as they can support the unit cost and are projected to have needs during the planning period.

Table 1
Brazoria County Off-Channel Reservoir Cost

Summary Sheet

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 71,895,092	$ 71,895,092
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 25,163,282	$ 25,163,282
3	LAND & EASEMENTS	1	LS	$ 31,412,919	$ 31,412,919
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 26,560,000	$ 26,560,000
5	INTEREST DURING CONSTRUCTION	1	LS	$ 18,867,308	$ 18,867,308
	PROJECT COST				**$ 173,898,602**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ -	$ 11,557,568
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ -	$ 1,691,326
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ -	$ 15,702,812
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 28,951,707**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 10,605,112	$ 10,605,112
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$ 61,188,000	$ 61,188,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ 101,980	$ 101,980
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 71,895,092**

Table 1
Brazoria County Off-Channel Reservoir Cost (continued)

ALL FACILITIES

OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 10,605,112	$ 159,077
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previo	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$ 61,188,000	$ 1,529,700
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 101,980	$ 2,550
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 1,691,326**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Lake Livingston Water Supply & Sewer Service Company (LLWSSSC) Surface Water Project

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of water treatment plant facilities to treat raw surface water

SUPPLY QUANTITY: 954 acre-feet

SUPPLY SOURCE: Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL CAPITAL COST: $3,088,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $373 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

LLWSSSC has contracted with the Trinity River Authority for raw water supplies through 2040. This water would be treated at two surface water treatment plates, the “East WTP” with a capacity of 1.5 million gallons per day (MGD), and the “North WTP” with a projected capacity of 1.25 MGD.

Analysis:

Anticipated treatment plant configuration for both plants is a conventional, rectangular package plant with an external concrete basin. Disinfection would likely include chlorine dioxide for pre-disinfection and chloramines or chlorine for post-disinfection. Raw water intake would be via either a traditional sump with submersible water pumps or utilize a floating intake structure. Treated water would be stored in a ground storage tank.

Water User Group Application:

Water treated by the SWPs would be expected to serve demands for LLWSSSC.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. There would be considerations based on the type and disposal location of waste residuals from treatment.

Issues and Considerations:

No location-specific issues have been identified at this time.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Sealy Groundwater Treatment Expansion

DATE: July 2, 2010

SUMMARY

STRATEGY DESCRIPTION: Expansion of existing groundwater well capacity

SUPPLY QUANTITY: 360 acre-feet in 2011, 888 acre-feet in 2060

SUPPLY SOURCE: Expanded Use of the Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2010

TOTAL CAPITAL COST: $6,450,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $966 per acre-foot

Water Management Strategy Analysis Description

Introduction:

Sealy, Texas is the largest city in Austin County, located approximately 50 miles west of Houston at the crossroads of Interstate 10 and Hwy. 36. Sealy has several manufacturing and industrial facilities which produce and distribute corrugated boxes, military vehicles, flanges, bricks and concrete products. Currently, the City of Sealy has a maximum daily groundwater supply of 3.3 MGD, or approximately 3,600 acre-feet per year. Additional groundwater supply will need to be developed to meet projected future population and economic growth in the area.

Table 1
Major Area Employers

Employer
BAE Systems
Walmart Distribution Center
Sealy ISD
Walmart Super Center
International Paper Co.
ACME Brick Company
Gulf States Toyota
Rinker Materials
Waterbrook Community Association

Analysis:

With the increased migration of population to the west of Houston, and the increased interest in the available property in the Sealy and the southern Austin county region for residential (high density development), commercial and industrial developments, Sealy is projected to have future population growth and water demands that will exceed current supplies. The existing infrastructure will not be adequate to provide anticipated water needs beginning in the year 2011.

Water User Group Application:

Currently, the City of Sealy is projected significant population and economic growth in two specific areas in the City. In the southwest part of the existing service area, single family residential development and commercial sites are anticipated to begin development. The future development in this area will require a new groundwater plant to meet projected water demands. The new groundwater plant will consist of a water well, groundwater storage tanks, booster pumps and controls. The new plant is projected to cost approximately $2,500,000. Development to the north of the city's service area is expected to require a new water plant due to the elevation difference between the new development and the existing system. The new groundwater plant would also consist of a new groundwater well, ground storage facilities, booster pumps, and a control building. The new plant is projected to cost approximately $3,250,000. Engineering fees for both projects are anticipated to be approximately $700,000. The total cost of the new groundwater plants is anticipated to be $6,450,000.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. There would be considerations based on the type and disposal location of waste residuals from treatment.

Issues and Considerations:

No location-specific issues have been identified at this time.

Appendix 4C

Cost Estimating Procedures

Contents

List of Tables

Section 1 - Cost Estimating Procedures (TWDB Region H)

The cost estimates of this study are expressed as one of three main categories that were dictated by TWDB guidelines: capital costs, other project costs, and annual project costs. Capital costs consist of all material, labor, and equipment expenses that are expended in the construction activities of a project. Other project costs include expenses that are not directly associated with the construction activities, such as engineering, land and easement acquisition, environmental studies, mitigation, and construction interest. Annual project costs consist of all costs that are incurred by the project upon implementation, either in repayment of borrowed funds or operating and maintaining the facility. *Table 4C-1* illustrates the primary components of the preliminary cost estimate. Cost estimating methods for the technical evaluation of alternatives considered for use in TWDB Region H are explained in the following sections.

Table 4C-1

Major Estimating Categories

CAPITAL COSTS	
1.	**Pump Stations**
2.	**Pipelines**
3.	**Water Treatment Plants**
4.	**Water Storage Tanks**
-	Ground Level
-	Elevated
5.	**Off-Channel Reservoirs**
6.	**Well Fields**
-	Injection
-	Recovery
-	ASR Wells
7.	**Dams & Reservoirs**
8.	**Relocations**
9.	**Water Distribution System Improvements**
10.	**Other Items**

OTHER PROJECT COSTS	
1.	**Engineering, Financial & Legal Services, and Contingencies**
-	Includes Design, Bidding & Construction Phase Services, Geotechnical, and Surveying
2.	**Land and Easements**
-	Land Purchases
-	Temporary Easements
-	Permanent Easements
-	Includes Legal Services, Sales Commissions, & Surveying
3.	**Environmental - Studies and Mitigation**
-	Environmental & Archaeology Studies
-	Permitting
-	Mitigation
4.	**Interest During Construction**

ANNUAL COSTS	
1.	**Debt Service**
2.	**Operation & Maintenance (O&M)**
3.	**Pumping Energy Costs**
4.	**Purchase of Water (if applicable)**

Section 2 – Capital Costs

Capital costs, generally known as construction costs, have been compiled from a variety of reliable sources and analyzed for trends that can be used for estimating purposes. Once a trend has been identified, a set of representative values is entered into a cost table, from which the user can easily and efficiently locate a cost estimate. Each cost table is explained in detail in the following sections.

The original construction cost data was based on values as of the second quarter 2002. All construction cost data was updated and adjusted to September 2008, as required by TWDB (Exhibit C), by using the Engineering News Record's Construction Cost Index (ENR CCI) ratio. The ENR CCI value for the Second Quarter of 2002 was 6508 determined by averaging the index values for April, May, and June of 2002 (6480, 6512, 6532 respectively). The ENR CCI value for September 2008 was 8557.

For example, to update a representative cost from June of 2002 (ENR CCI value 6532), to September 2008, the cost from June of 2002 would be multiplied by the ratio of 8557 over 6532. The ENR CCI values are based on representative steel, cement, and lumber material and labor construction costs, averaged across 20 cities. The index measures the amount of money it would cost to purchase a theoretical quantity of construction material and labor in one year, as opposed to another. Monthly index values are available from 1990 to the present, and annual average values are reported back to 1908, but the base year is 1913 with an arbitrary index value of 100.

2.1 Pump Stations

The cost of a pump station depends upon a wide variety of conditions, including pump discharge, pumping head, pump type, site conditions, desired usage, and structural design. In constructing a preliminary estimate of the cost of a pump station, the intent is not to determine the pump type or details of the station structural design, but rather to estimate the cost of a general station capable of pumping the desired discharge at the necessary head conditions. Regional pump station project cost estimates and construction records were used to adjust published EPA historical pump station cost data. By using a comprehensive and reliable source of pump station cost data, recognizing the trend, and then adjusting that trend to similar projects in the region, a representative set of values for this region was determined. The cost table for this section, shown in *Table 4C-2*, displays the costs for pump stations at a variety of horsepower requirements, based on peak discharge and design head. Higher horsepower requirements may require multiple pump stations.

Pump stations are generally classified as transmission or intake type structures, depending on the source of the water coming into the station. Intake stations normally pump water from a raw water source, such as a river or reservoir, and therefore require an intake structure to insure that proper flow conditions into the station are permitted. Transmission stations normally act as boosters in a plant or pipeline and do not require intake structures since the inlet pipe flow conditions are fairly constant. The total cost for the intake of a pump station has been estimated as an additional 20 percent of the pump station construction cost. While 10 percent is structural additions, the other 10 percent is trash rack screens and miscellaneous rack cleaning equipment.

Table 4C-2

Pump Station Costs

Pump Station Horsepower (HP)	Pump Station Construction Cost ($)
0	0
700	8,790,000
1000	10,812,000
2000	14,739,000
3000	17,037,000
4000	18,668,000
5000	19,932,000
6000	20,964,000
7000	21,838,000
8000	22,595,000
9000	23,262,000
10000	23,859,000
12000	24,893,000
15000	26,157,000
20000	27,787,000

[1] Values as of September 2008.
[2] Add 20 percent for pumps stations with intake structures.
[3] Add 35 percent for pumps stations with standby power.

All electrical costs, with the exception of standby power, are included in the base pump station construction cost. Standby power, normally either a diesel generator or a dual power feed, is necessary to insure that the pump station can remain operational in the event of a power failure. Standby power is an optional feature which has been estimated as an additional 35 percent of the base pump station construction cost.

The costs of pump stations located in water treatment plants are accounted for in the water treatment plant cost table.

2.2 Pipelines

Pipeline capital costs are dependent upon a variety of factors, including pipe material used, trenching slopes and depths, fill material quality, frequency of valves/fittings, number of obstruction crossings, necessity of pavement removal and replacement, utility interference, traffic control, geologic conditions, and degree of urbanization. Due to the lack of significant quantities of rock in the primarily sandy clay soil of the region, only one soil type was analyzed. *Table 4C-3* shows the unit costs for pipe diameters from 6-inches to 144-inches for rural and urban construction.

Table 4C-3

Pipeline Unit Costs

Pipe Diameter (inches)	Rural Construction ($ / LF)	Urban Construction ($ / LF)
6	65	120
8	70	125
10	80	130
12	80	130
14	90	155
16	110	185
18	125	210
20	145	235
24	175	295
27	205	340
30	235	395
33	260	430
36	290	485
42	345	570
48	405	675
54	470	785
60	535	895
64	585	970
66	610	1010
72	690	1140
78	740	1240
84	810	1350
90	880	1465
96	955	1590
102	1030	1710
108	1100	1835
114	1180	1960
120	1250	2090
144	1565	2605

[1] Values as of September 2008.

The previous unit costs are based on open cut construction method with no special crossings. Special crossings at railroads, streets, and rivers will likely be accomplished by horizontal boring, also known as pipe jacking. Horizontal boring costs are shown in *Table 4C-4*.

Table 4C-4

Pipeline Crossing Unit Costs

Pipe Diameter (inches)	Total Cost ($ / inch dia. / LF)
6	800
8	820
10	860
12	850
14	900
16	960
18	1050
20	1030
24	1200
27	1260
30	1330
33	1410
36	1480
42	1660
48	1830
54	2020
60	2220
66	2340
72	2450
78	2550
84	2640
90	2720
96	2800
102	2880
108	2940
114	2740

[1] Values as of September 2008.
[2] Costs based on Horizontal Boring (Jacking).

2.3 Water Treatment Plants

Water treatment plant capital costs are shown in *Table 4C-5* for three alternative treatment methods; Groundwater Chlorination, Direct Filtration, and Conventional Filtration. Groundwater Chlorination process is used almost exclusively on groundwater sources while the other two processes use filtration, mostly for surface water sources. In general, the quality of the source water normally dictates which process is used.

Groundwater is commonly treated by chlorination only because the process is relatively inexpensive compared to filtration, and the treatment equipment is small enough that each groundwater well can normally have its own. The most common of the surface water treatment methods is conventional filtration treatment. When influent suspended solids concentrations are sufficiently low that they are completely removed by filtration and result in a reasonable backwash cycle on the filtration units, direct filtration can be used. The direct filtration plant is essentially the same as the conventional filtration plant except that the sedimentation process is deleted.

Table 4C-5

Water Treatment Plant Costs

Plant Capacity (MGD)	Groundwater Chlorination Plant Cost ($)	Direct Filtration Plant Cost ($)	Conventional Filtration Plant Cost ($)
1	528,000	3,778,000	4,902,000
10	3,077,000	22,853,000	28,565,000
50	9,917,000	73,669,000	92,085,000
75	14,875,000	110,501,000	138,126,000
100	19,834,000	147,334,000	184,168,000
150	29,750,000	221,002,000	276,253,000
200	39,667,000	294,669,000	368,336,000
[1] Values as of September 2008.			

As can be seen in *Table 4C-6*, the choice of treatment methods is dictated by both the quality of the influent water source and the intended destination of the treated water. Surface waters treated by direct filtration and wastewater reclamation are not intended for conveyance to a public water distribution system. The reason for this is that surface water and wastewater effluent normally have high suspended solids content, and the treatment processes cannot remove enough of the suspended solids to produce the water quality necessary for public water supplies.

Table 4C-6

Water Treatment Method Descriptions

Water Treatment Method	Source			Destination	
	Groundwater	Surface Water	Wastewater	Aquifer or Non-Potable Use	Public Water System Distribution
Groundwater Chlorination	●			●	●
Direct Filtration	●			●	●
Direct Filtration		●		●	
Conventional (Filtration)		●		●	●
Wastewater Reclamation			●	●	

2.4 Storage Tanks

Storage tanks are used in a variety of different water supply systems including pump stations, distribution systems, and pipelines. Several factors influence the cost of storage tanks including frequency of use, capacity, type of construction material, location, architectural treatment, and corrosion resistance. Steel tanks are normally constructed in elevated or ground-level locations, while prestressed concrete tanks are normally constructed at or below grade. Concrete does not require cathodic protection or any type of protective exterior coating. Below grade tanks require no architectural treatment but have higher excavation and backfill costs. The costs of storage tanks that are shown in *Table 4C-7* are based on ground-level prestressed concrete construction for a range of capacities. The costs of elevated storage tanks that are shown in *Table 4C-8* are based on elevated steel construction for a range of capacities.

Table 4C-7

Ground Level Water Storage Tank Costs

Storage Capacity (MG)	Cost ($)
0.01	224,000
0.05	265,000
0.10	347,000
0.5	686,000
1.0	1,023,000
2.0	1,526,000
4.0	2,296,000
6.0	3,071,000
7.5	3,711,000
9.0	4,225,000
10.0	4,555,000
15.0	6,494,000

[1] Values as of September 2008.
[2] Costs based on ground level prestressed concrete construction.

Table 4C-8

Elevated Water Storage Tank Costs

Storage Capacity (MG)	Cost ($)
0.01	$359,000
0.10	$405,000
0.25	$576,000
0.50	$933,000
0.75	$1,282,000
1.00	$1,641,000

[1] Values as of September 2008.
[2] Costs based on elevated steel construction.

2.5 Off-Channel Reservoirs

An off-channel reservoir is a reservoir that receives minimal or no natural inflow. Two methods are normally employed in the construction of off-channel reservoirs. A dam can be constructed along a minor tributary or a ring dike can be constructed. Since little or no natural inflow reaches the reservoir, water is normally supplied by pumping from a nearby river or other location. The cost of the off-channel reservoir is highly dependent on the height of the levees that are constructed and the area of land that is available for use. Land costs will be considerably higher for a shorter ring dike with a much larger circumference that can still hold the same capacity as a taller ring dike with a smaller circumference. *Table 4C-9* shows the cost of off-channel reservoirs for a range of capacities.

Table 4C-9

Off-Channel Reservoir Costs

Storage Volume (ac-ft)	Ring Dike Cost ($)
500	1,368,000
1,000	1,974,000
2,500	3,278,000
5,000	6,503,000
7,500	8,122,000
10,000	9,540,000
12,500	10,827,000
15,000	15,284,000
17,500	16,621,000
20,000	22,282,000
22,500	23,435,000
25,000	25,083,000

[1] Values as of September 2008.
[2] Values are based on ring dike construction.
[3] Values also used for cost of dams on minor tributaries.

2.6 Well Fields

The cost for public supply wells are shown in *Table 4C-10* and are generalized estimates by LBG-Guyton Associates. The cost estimates include the well drilling and construction, permanent pump equipment, electric motor and discharge head. If engineering and design, construction management and inspection, discharge piping and electrical equipment are to be included, then add 25 to 35 percent to the estimates in *Table 4C-10*. The well cost estimates do not include the capital costs or other water facilities or equipment listed in this Section.

Table 4C-10

Public Supply Well Costs

Well Depth (feet)	Well Capacity (gpm)				
	200	400	700	1,000	1,500
Static Water Level Less than 200 Feet Below Land Surface					
300	$270,000	$350,000	$410,000	-	-
500	$310,000	$390,000	$460,000	$650,000	-
700	$340,000	$410,000	$510,000	$700,000	$770,000
1,000	$400,000	$485,000	$580,000	$770,000	$840,000
1,500	$460,000	$500,000	$650,000	$850,000	$925,000
Static Water Level Between 200 and 300 Feet Below Land Surface					
500	-	-	-	-	-
700	$340,000	$460,000	$550,000	$720,000	$780,000
1,000	$420,000	$540,000	$630,000	$800,000	$870,000
1,500	$480,000	$560,000	$700,000	$875,000	$950,000
Static Water Level Between 300 and 400 Feet Below Land Surface					
500	-	-	-	-	-
700	$370,000	$510,000	$630,000	$800,000	$850,000
1,000	$440,000	$580,000	$700,000	$870,000	$920,000
1,500	$500,000	$600,000	$800,000	$950,000	$1,000,000
Static Water Level Between 400 and 500 Feet Below Land Surface					
1,000	$450,000	$590,000	$710,000	$880,000	-
1,500	$520,000	$640,000	$840,000	$1,000,000	-

[1] Cost estimates as of September 2008.

[2] Costs based on underreamed, gravel-packed wells with steel casing and stainless steel screens, pump discharge head and electric motor.

[3] Costs estimated by LBG-Guyton Associates.
[4] Irrigation well costs assumed to be 50% to 60% of public water supply well cost estimates.

2.7 Dams and Reservoirs

Dam and reservoir construction costs were estimated on an individual case basis due to the unique nature of each project. Most dams and reservoirs that are currently under consideration have been studied in detail in the past and the previous cost estimates normally include both construction cost and other project costs. In most cases, the cost estimates from these previous studies were used, after adjusting the costs with the ENR CCI to September 2008.

2.8 Relocations

In some cases, projects required the use of lands that contain existing facilities or improvements. While relocation of existing utilities, roads, homes, businesses, and other facilities is oftentimes an option, outright purchase cost of the land must be allowed for in cases where it is not deemed acceptable to relocate. Relocation cost estimates are addressed on an individual project basis due to the variation in the cost of the land and facilities which require relocation.

2.9 Water Distribution System Improvements

A water distribution system is used to distribute water throughout the service area by means of pump stations, piping, valves, storage tanks, and a variety of other equipment and facilities. When a city or entity requires additional water, improvements to the water distribution system are normally necessary. The cost of the water distribution system improvements varies considerably based on the extent of the existing and proposed facilities and the wide variety of facilities that make up a water distribution system. Costs are estimated on an individual basis using previous proposed water distribution facility studies and cost estimates.

2.10 Stilling Basins

Stilling basins are normally used in water distribution systems to decrease the water flow velocity and allow sediments to settle out prior to discharging into a canal, reservoir, or other body of water. Stilling basin costs are estimated based on a target detention time of two hours and includes all excavation and hauling costs necessary to construct the basin. Optional mechanical sedimentation basin dredging equipment is not included. Stilling basin construction costs, when applicable, are estimated as $2,800 per cfs of discharge.

2.11 Wastewater Reclamation Plants

Wastewater effluent can be treated and reclaimed for aquifer injection or non-potable use. The reverse osmosis membrane treatment method, including denitrification, was used to estimate the wastewater reclamation plant costs that are shown in *Table 4C-11*. Reclaimed wastewater should not be sent directly to a public water distribution system.

Table 4C-11

Wastewater Reclamation Plant Costs

Plant Capacity (MGD)	**Wastewater Reclamation Plant Cost ($)**
1	7,121,400
10	35,692,600
50	72,651,800
75	108,977,800
100	145,303,800
150	217,955,600
200	290,607,600

[1] Values as of September 2008
[2] Based on Reverse Osmosis Membrane process, with Denitrification, from Trans-Texas Water Program, Southeast Area, Technical Memorandum entitled "Wastewater Reclamation", March 19, 1998.

Section 3 - Other Project Costs

3.1 Engineering, Financial and Legal Services, and Contingencies

Engineering, financial, legal services, and contingencies are estimated as a lump sum, according to TWDB guidelines, as 30 percent of the total construction cost for pipelines and 35 percent of the total construction cost for all other types of projects.

3.2 Land and Easements

Land related costs for a project are typically one of two types: either cost of land permanently purchased for construction of a facility or easement costs. The amount and cost of land purchased for various types of projects is considered on an individual project basis taking into consideration similar project experience. Easement costs, on the other hand, can vary considerably in a single project based on the variety of site conditions that a pipeline may encounter along its path. Easements are generally acquired for pipeline projects and can normally be classified as temporary or permanent. Permanent easements are purchase of the land that the pipeline will remain in once it is completed including a wide enough buffer zone to allow maintenance access and to protect the pipeline from other parallel utilities. Temporary easements are “rented” during the construction phase to allow extra room for material and equipment staging as well as other construction related activities.

Land related costs include legal services, sales commissions, and surveying. Ten percent of the total land and easement costs is added to account for all legal services, sales commissions, and surveying associated with the land related purchases. Land costs can vary considerably throughout the region based on the degree of urbanization and other economic factors. County appraisal district records, previous project estimates, and other land value sources are used to estimate the land related costs.

3.3 Environmental and Archaeology Studies, Permitting, and Mitigation

Costs for environmental studies, archaeological studies, permitting, and mitigation are estimated on an individual project basis taking into consideration previous project estimates, the judgement of qualified professionals, and any other available information. In the case of reservoir projects, mitigation costs were generally equal to the land value of the acreage that would be inundated.

3.4 Interest During Construction

Interest during construction is calculated as the cost of the interest on the borrowed funds less the return on the unspent portion of the borrowed funds that are invested during construction. Interest during construction is calculated, according to TWDB guidelines, as the total interest accrued by a 6 percent annual interest rate on the total borrowed funds at the end of the construction phase less a 4 percent annual rate of return on investment of unspent funds. A standard construction period of 2 years is used to calculate interest.

Section 4 – Annual Costs

Annual costs are expenses which the owner of the project can expect once the project is completed. Each of these costs is described in detail in the following subsections.

4.1 Debt Service

Debt service is the total annual payment that is required to repay borrowed funds. Debt service was calculated according to TWDB Section 4.1.2 of Exhibit C, assuming an annual interest rate of 6 percent and a repayment period of 40 years for reservoir projects and 20 years for all other projects.

4.2 Operation and Maintenance

Operation and maintenance (O&M) costs include all labor and materials required to run the facility and keep it operational including periodic repair and/or replacement of facility equipment. In accordance with TWDB guidelines, O&M costs are calculated as 1.0 percent of the total estimated construction costs for pipelines, distribution facilities, tanks, and wells, 1.5 percent of the total estimated construction costs for dams and reservoirs, and 2.5 percent of the total estimated construction costs for intake structures and pump stations. Water treatment plant O &M cost estimates are shown in *Table 4C-12* below.

Table 4C-12

Operation and Maintenance Costs For Water Treatment Plants

Plant Capacity (MGD)	Groundwater Chlorination Plant Cost ($)	Direct Filtration Plant Cost ($)	Conventional (Filtration) Plant Cost ($)	Wastewater Reclamation Plant Cost ($)
0	**0**	**0**	**0**	**0**
1	63,000	221,000	276,000	300,000
10	369,000	2,214,000	2,764,000	3,000,000
50	1,190,000	11,057,000	13,821,000	15,000,000
75	1,785,000	16,585,000	20,724,000	22,493,000
100	2,380,000	22,100,000	28,700,000	29,999,000
150	3,570,000	33,156,000	41,449,000	44,986,000
200	4,760,000	44,200,000	55,256,000	59,985,000

[1] Values as of September 2008.

4.3 Pumping Energy Costs

Per TWDB guidelines, power costs are calculated on an annual basis using calculated horsepower input and a power purchase cost of $0.09 per KWh.

4.4 Purchase of Water

The purchase of water, if applicable to the management strategy being considered, is dependent on the source and type (raw or treated) of water being purchased. The cost is addressed on an individual project basis due to the wide variety of water types and sources.

Section 5 - Presentation of Cost Estimates

Each water management strategy is provided with a cost estimate that shows total construction costs, total project costs (the sum of construction costs and other project costs), and total annual project costs. The unit cost of each alternative per unit of water delivered (total project cost per acre-foot of water delivered) is also presented for further comparison. Each site specific alternative was presented in as much detail in the estimate as is necessary to accurately estimate the management strategy that is being considered. Detailed cost estimates are completed for each WWP in *Appendix 4C-1* and for each WUG in *Appendix 4C-2*. Where possible, WWP-level capital costs are developed from information provided by project sponsors; where sponsor data is not available, costs were developed using the methodology outlined in this appendix and include engineering, legal cost, and contingencies. WUG-level costs were developed using the methodology described in this appendix.

This Page

Intentionally Left Blank

Region H
Table 4C-1: WWP-Level Project Cost

	Source Identifiers									Project Volume (ac-ft/yr)							Capital Costs ($)					
WMS	Source Name	Source RWPG	Source Basin	Source County	Source ID	Source Basin ID	ID + Basin	Sponsor / Purchaser WWP	WWP ID	2010	2020	2030	2040	2050	2060	Peak Value	2010	2020	2030	2040	2050	2060
Contractual Strategies																						
BRA to Brazosport Water Authority Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOSPORT WATER AUTHORITY	2000	0	116	124	1,557	3,183	5,435	5,435	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	GULF COAST WATER AUTHORITY	325	0	12,165	27,627	31,782	37,777	42,624	42,624	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	GULF COAST WATER AUTHORITY	325	0	4,324	4,324	4,324	4,324	4,324	4,324	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	GULF COAST WATER AUTHORITY	325	0	0	0	0	0	4,517	4,517	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	GULF COAST WATER AUTHORITY	325	0	1,290	8,057	14,099	14,099	14,099	14,099	$0	$0	$0	$0	$0	$0
BRA to NRG Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	NRG	398300	0	0	0	0	0	8,500	8,500	$0	$0	$0	$0	$0	$0
BRA to Richmond-Rosenberg Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	RICHMOND-ROSENBERG	999905	0	0	0	1,091	2,970	1,848	2,970	$0	$0	$0	$0	$0	$0
BRA to Richmond-Rosenberg Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	RICHMOND-ROSENBERG	999905	0	0	0	0	90	3,797	3,797	$0	$0	$0	$0	$0	$0
BRA to Sugar Land -Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	SUGAR LAND	999906	0	0	0	231	490	449	490	$0	$0	$0	$0	$0	$0
BRA to Sugar Land -Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	SUGAR LAND	999906	0	0	0	0	0	922	922	$0	$0	$0	$0	$0	$0
BRA to Sugar Land - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	SUGAR LAND	999906	0	1,027	2,947	3,385	3,385	3,385	3,385	$0	$0	$0	$0	$0	$0
COH to Baytown Area Water Authority - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	BAYTOWN AREA WATER AUTHORITY	15	0	26	262	398	535	692	692	$0	$0	$0	$0	$0	$0
COH to BRA Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOS RIVER AUTHORITY	331	0	27,498	25,201	57,886	69,755	69,755	69,755	$0	$0	$0	$0	$0	$0
COH to CHCRWA Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	CHCRWA	999902	0	977	862	720	631	546	977	$0	$0	$0	$0	$0	$0
COH to CHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CHCRWA	999902	0	794	1,552	1,711	1,800	1,885	1,885	$0	$0	$0	$0	$0	$0
COH to City of Pasadena Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF PASADENA	651900	1,865	2,278	2,665	3,153	3,579	4,068	4,068	$0	$0	$0	$0	$0	$0
COH to NFBWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	0	444	17,971	31,161	41,172	50,442	50,442	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Houston Indirect Reuse	HOUSTON INDIRECT REUSE	H	SAN JACINTO	HARRIS	3510101	10	351010110	NHCRWA	999904	0	0	0	18,130	31,629	0	31,629	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	NHCRWA	999904	0	30,880	30,880	32,734	29,030	25,398	32,734	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NHCRWA	999904	0	25,573	52,161	32,177	17,382	57,643	57,643	$0	$0	$0	$0	$0	$0
COH to North Channel Water Authority Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NORTH CHANNEL WATER AUTHORITY	607473	1,954	2,392	2,869	3,511	4,157	4,912	4,912	$0	$0	$0	$0	$0	$0
COH to SJRA Contract - Lake Conroe	CONROE LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10060	10	1006010	SAN JACINTO RIVER AUTHORITY	240	0	36,377	55,538	54,582	53,581	52,534	55,538	$0	$0	$0	$0	$0	$0
COH to WHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	1,241	31,837	46,324	52,759	55,549	58,402	58,402	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	CITY OF GALVESTON	316200	0	1,225	1,225	1,225	1,225	1,225	1,225	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - Brazos Run-of-River	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B	12	3461205322B12	CITY OF GALVESTON	316200	0	5,360	5,360	5,360	5,360	5,360	5,360	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - San Jacinto-Brazos Run-of-River	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A	11	3461105357A11	CITY OF GALVESTON	316200	0	677	677	677	677	677	677	$0	$0	$0	$0	$0	$0
GCWA to Fort Bend County WCID #2 Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	FORT BEND COUNTY WCID #2	821000	0	491	1,092	1,092	1,092	1,092	1,092	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	GALVESTON COUNTY WCID #1	316325	0	131	274	305	340	379	379	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	GALVESTON COUNTY WCID #1	316325	0	107	107	107	107	107	107	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Brazos Run-of-River	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B	12	3461205322B12	GALVESTON COUNTY WCID #1	316325	0	469	469	469	469	469	469	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - San Jacinto-Brazos Run-of-River	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A	11	3461105357A11	GALVESTON COUNTY WCID #1	316325	0	59	59	59	59	59	59	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	MISSOURI CITY	999903	0	0	68	321	571	594	594	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	MISSOURI CITY	999903	0	0	0	0	0	4,501	4,501	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	MISSOURI CITY	999903	0	713	6,262	10,340	10,340	10,340	10,340	$0	$0	$0	$0	$0	$0
SJRA to COH Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	SAN JACINTO RIVER AUTHORITY	240	0	0	1,356	5,300	3,872	2,428	5,300	$0	$0	$0	$0	$0	$0
TRA to Houston Transfer	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF HOUSTON	396200	0	0	116,738	123,524	123,524	123,524	123,524	$0	$0	$0	$0	$0	$0
TRA to SJRA Transfer	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	SAN JACINTO RIVER AUTHORITY	240	0	0	0	7,935	39,096	76,476	76,476	$0	$0	$0	$302,781,597	$0	$0
Groundwater Reduction Plans																						
CHCRWA GRP	Multiple	H	Multiple	Multiple	Multiple	Multiple	Multiple	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
COH GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	CITY OF HOUSTON	396200	3,762	11,417	16,809	19,870	22,399	24,990	24,990	$0	$0	$0	$0	$0	$0
Fort Bend WCID #2 GRP	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	FORT BEND COUNTY WCID #2	821000	0	2,296	5,753	5,753	5,753	5,753	5,753	$0	$10,631,491	$7,098,683	$7,098,683	$0	$0
NFBWA GRP	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	35,009	61,021	70,363	84,943	96,103	106,402	106,402	$0	$0	$0	$0	$0	$0
NHCRWA GRP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	91,167	117,755	99,625	81,126	117,755	117,755	$0	$0	$0	$0	$0	$0
Missouri City GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	MISSOURI CITY	999903	0	5,182	9,431	13,149	13,149	17,562	17,562	$0	$51,260,490	$40,810,500	$0	$0	$0
Richmond Rosenberg GRP (WFB SWTP)	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	RICHMOND-ROSENBERG	999905	7,500	7,500	7,500	7,500	7,500	7,500	7,500	$0	$43,205,325	$29,963,475	$29,897,900	$0	$14,153,450
SJRA WRAP	Multiple	H	Multiple	Multiple	Multiple	Multiple	Multiple	SAN JACINTO RIVER AUTHORITY	240	0	36,377	55,538	62,517	92,677	129,010	129,010	$0	$380,000,000	$180,000,000	$200,000,000	$140,000,000	$0
Sugar Land GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	SUGAR LAND	999906	0	1,587	7,987	8,656	8,915	9,796	9,796	$0	$82,825,000	$78,535,049	$0	$0	$0
WHCRWA GRP	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$0	$0	$0	$0	$0	$0
Reservoir Strategies																						
Allens Creek Reservoir	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOS RIVER AUTHORITY / CITY OF HOUSTON	331 / 396200	0	57,393	55,096	87,781	99,650	99,650	99,650	$0	$222,752,400	$0	$0	$0	$0
Brazoria Off-Channel Reservoir	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR	12	BRAOCR12	BRAZOS RIVER AUTHORITY	331	0	0	0	0	0	24,000	24,000	$0	$0	$0	$0	$0	$173,898,602
Dow Off-Channel Reservoir	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR	12	DOWOCR12	THE DOW CHEMICAL CO.	237200	0	21,800	21,800	21,800	21,800	21,800	0	$0	$124,468,000	$0	$0	$0	$0
Fort Bend Off-Channel Reservoir	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	BRAZOS RIVER AUTHORITY	331	0	0	0	0	90	45,943	45,943	$0	$0	$0	$0	$202,514,788	$0
GCWA Off-Channel Reservoir	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC	11	GCWAOC11	GULF COAST WATER AUTHORITY	325	0	0	39,500	39,500	39,500	39,500	39,500	$0	$0	$197,448,012	$0	$0	$0
Reuse Strategies																						
Wastewater Reuse for Industry	WASTEWATER REUSE FOR INDUSTRY	H	SAN JACINTO	HARRIS	3610101	10	361010110	CITY OF HOUSTON	396200	0	0	0	0	0	67,200	67,200	$0	$0	$0	$0	$0	$332,051,761
Permit / Other Strategies																						
BRA System Operations Permit	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	BRAZOS RIVER AUTHORITY	331	0	6,621	18,870	25,350	25,350	25,350	25,350	$0	$0	$0	$0	$0	$0
Freeport Desalination	GULF OF MEXICO SEA WATER	H	GULF	RESERVOIR	4124999	24	412499924	BRAZOS RIVER AUTHORITY	331	0	0	0	0	33,600	33,600	33,600	$0	$0	$0	$255,699,000	$0	$0
Houston Bayous Permit	SAN JACINTO RUN-OF-RIVER HOUSTON BAYOUS	H	SAN JACINTO	HARRIS	34UNPERMITTED	10	34UNPERMITTED10	CITY OF HOUSTON	396200	0	0	0	0	0	0	0	$0	$20,956,000	$0	$0	$0	$0
Infrastructure Strategies																						
Brazos Saltwater Barrier	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	BRAZOS RIVER AUTHORITY	331	0	0	0	0	0	0	0	$0	$44,470,739	$0	$0	$0	$0
CHCRWA Transmission	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
CHCRWA Internal Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
CLCND West Chambers County System	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B	08	3460804279B08	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	0	1,691	1,978	2,235	2,511	2,804	2,804	$0	$20,380,000	$0	$0	$0	$0
COH Treatment Expansion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HOUSTON	396200	16,000	280,000	128,000	64,000	48,000	48,000	280,000	$66,895,529	$975,979,521	$446,248,855	$223,261,769	$166,643,243	$166,643,243
COH Distribution Expansion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HOUSTON	396200	TBD	TBD	TBD	TBD	TBD	TBD	TBD	$0	$229,390,000	$31,650,000	$0	$0	$0
Huntsville WTP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HUNTSVILLE	410000	11,200	11,200	11,200	11,200	11,200	11,200	11,200	$61,023,906	$0	$0	$0	$0	$0
Luce Bayou	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF HOUSTON	396200	0	128,259	206,276	207,629	205,171	270,742	270,742	$0	$253,916,914	$0	$0	$0	$0
NFBWA 2025 Shared Transmission (w/ WHCRWA)	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	0	21,878	39,405	52,595	62,606	71,876	71,876	$0	$14,000,000	$142,000,000	$57,000,000	$0	$0
NFBWA Internal Distribution	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	35,009	61,021	70,363	84,943	96,103	106,402	106,402	$74,000,000	$15,000,000	$106,000,000	$10,000,000	$10,000,000	$10,000,000
NHCRWA Internal 2010 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	34,714	34,714	34,714	34,714	34,714	34,714	$153,149,640	$0	$0	$0	$0	$0
NHCRWA Internal 2020 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	91,167	91,167	91,167	91,167	91,167	91,167	$0	$345,292,192	$0	$0	$0	$0
NHCRWA Internal 2030 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	0	117,755	117,755	117,755	117,755	117,755	$0	$0	$37,439,584	$0	$0	$0
NHCRWA Transmission 2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	34,714	34,714	34,714	34,714	34,714	34,714	$80,690,624	$0	$0	$0	$0	$0
NHCRWA Transmission 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	91,167	91,167	91,167	91,167	91,167	91,167	$0	$172,558,512	$0	$0	$0	$0
NHCRWA Transmission 2030	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	0	117,755	117,755	117,755	117,755	117,755	$0	$0	$0	$0	$0	$0
WHCRWA Internal Distribution	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$135,309,000	$340,470,000	$76,693,000	$0	$0	$0
WHCRWA 2020 Shared Transmission (w/ NFBWA)	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$45,110,193	$244,974,000	$0	$0	$0	$0
Alternative Strategies																						

Region H
Table 4C-1: WWP-Level Project Cost

WMS	Total Capital Cost	Total Annual Costs ($/year) 2010	2020	2030	2040	2050	2060	Source	Notes
Contractual Strategies									
BRA to Brazosport Water Authority Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to GCWA Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to NRG Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Richmond-Rosenberg Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0		
BRA to Richmond-Rosenberg Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land -Allens Creek	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land -Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to Baytown Area Water Authority - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to BRA Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to CHCRWA Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to CHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to City of Pasadena Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NFBWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Houston Indirect Reuse	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to North Channel Water Authority Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to SJRA Contract - Lake Conroe	$0	$0	$0	$0	$0	$0	$0		
COH to WHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - San Jacinto-Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Fort Bend County WCID #2 Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - San Jacinto-Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Missouri City Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Missouri City Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
GCWA to Missouri City Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
SJRA to COH Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
TRA to Houston Transfer	$0	$0	$0	$0	$0	$0	$0	Region H RWP Tech Memo	Strategy cost associated with Luce Bayou
TRA to SJRA Transfer	$302,781,597	$0	$0	$0	$37,101,862	$37,101,862	$10,703,983	Region H RWP Tech Memo	Cost associated with development of conveyance infrastructure.
Groundwater Reduction Plans									
CHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
COH GRP	$0	$0	$0	$0	$0	$0	$0	Region H RWP Tech Memo - Treatment	No cost as volume and treatment / distribution is associated with other strategies.
Fort Bend WCID #2 GRP	$24,828,857	$0	$1,310,164	$2,312,320	$2,387,576	$1,768,681	$1,149,785	FBC WCID 2 GRP	Annual O&M includes electic cost
NFBWA GRP	$0	$0	$0	$0	$0	$0	$0	NFBWA GRP	No cost as volume and treatment / distribution is associated with other strategies.
NHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	NHCRWA GRP	No cost as volume and treatment / distribution is associated with other strategies.
Missouri City GRP	$92,070,990	$0	$5,750,635	$10,328,943	$5,859,820	$2,301,775	$2,301,775	Missouri City GRP	Annual O&M cost assumed as 2.5% of project capital cost. No annual energy cost assumed due to limited information.
Richmond Rosenberg GRP (WFB SWTP)	$117,220,150	$0	$6,652,597	$13,441,309	$16,083,787	$13,471,435	$17,440,442	West FBC Regional SWTP PER	
SJRA WRAP	$900,000,000	$0	$42,630,132	$62,823,352	$52,130,132	$52,142,749	$34,705,838	SJRA WRAP Part 2	Annual costs beyond debt service estimated from SJRA WRAP Part II. O&M costs include electricity.
Sugar Land GRP	$161,360,049	$0	$17,561,104	$17,561,104	$3,493,000	$3,493,000	$3,493,000	Sugar Land CIP, Sugar Land GRP	Assuming O&M constant after 2014. No annual energy cost assumed due to limited information.
WHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	WHCRWA Summary	No cost as volume and treatment / distribution is associated with other strategies.
Reservoir Strategies									
Allens Creek Reservoir	$222,752,400	$0	$18,706,144	$18,706,144	$18,706,144	$18,706,144	$3,901,678	Region H RWP Tech Memo	
Brazoria Off-Channel Reservoir	$173,898,602	$0	$0	$0	$0	$0	$28,951,707		
Dow Off-Channel Reservoir	$124,468,000	$0	$10,484,000	$10,484,000	$10,484,000	$8,490,000	$8,490,000		
Fort Bend Off-Channel Reservoir	$202,514,788	$0	$0	$0	$0	$43,566,686	$43,566,686		
GCWA Off-Channel Reservoir	$197,448,012	$0	$0	$32,678,970	$32,678,970	$32,678,970	$32,678,970	Region H 2011 RWP	
Reuse Strategies									
Wastewater Reuse for Industry	$332,051,761	$0	$0	$0	$0	$0	$60,010,614	Region H RWP Tech Memo	
Permit / Other Strategies									
BRA System Operations Permit	$0	$0	$0	$0	$0	$0	$0	HDR, Inc.	
Freeport Desalination	$255,699,000	$0	$0	$0	$28,685,479	$28,685,479	$6,392,475	Region H 2011 RWP	Assuming O&M as 2.5 percent of capital cost. No annual energy cost assumed due to limited information.
Houston Bayous Permit	$20,956,000	$0	$1,827,040	$1,827,040	$0	$0	$0	Region H RWP Tech Memo	
Infrastructure Strategies									
Brazos Saltwater Barrier	$44,470,739	$0	$4,988,930	$4,988,930	$1,111,768	$1,111,768	$1,111,768	Region H RWP Tech Memo	Annual O&M cost assumed as 2.5% of project capital cost. No annual energy cost assumed due to limited information.
CHCRWA Transmission	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
CHCRWA Internal Distribution	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
CLCND West Chambers County System	$20,380,000	$0	$1,980,621	$1,980,621	$203,800	$203,800	$203,800	CLCND Funding App	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
COH Treatment Expansion	$2,045,672,161	$7,670,034	$121,707,226	$168,015,257	$109,009,300	$89,583,305	$89,598,340	Estimated using Reg H procedures	Energy costs not assumed due to limited data.
COH Distribution Expansion	$261,040,000	$0	$22,293,166	$25,369,057	$5,369,791	$2,610,400	$2,610,400	No data available	Not enough data available to estimate costs at this time.
Huntsville WTP	$61,023,906	$10,120,710	$10,120,710	$4,800,368	$4,800,368	$4,800,368	$4,800,368	Standard Region H assumptions	Annual O&M cost assumed as 2.5% of project capital cost. Assumes 10 MGD plant and pump station capacity.
Luce Bayou	$253,916,914	$0	$31,798,394	$31,798,394	$9,660,760	$9,660,760	$9,660,760	Luce Bayou Alternatives Analysis	O&M and electric scaled using CCI
NFBWA 2025 Shared Transmission (w/ WHCRWA)	$213,000,000	$0	$1,220,584	$13,600,791	$17,349,727	$4,969,520	$0	NFBWA Table from BGE	O&M costs not included as they include part of COH infrastructure O&M. No annual energy cost assumed due to limited information.
NFBWA Internal Distribution	$225,000,000	$6,451,657	$7,759,425	$10,549,331	$10,113,409	$1,743,692	$1,743,692	NFBWA Table from BGE	O&M costs not included as they include part of COH infrastructure O&M. No annual energy cost assumed due to limited information.
NHCRWA Internal 2010 Distribution	$153,149,640	$14,883,780	$14,883,780	$1,531,496	$1,531,496	$1,531,496	$1,531,496		
NHCRWA Internal 2020 Distribution	$345,292,192	$0	$33,557,069	$33,557,069	$3,452,922	$3,452,922	$3,452,922		
NHCRWA Internal 2030 Distribution	$37,439,584	$0	$0	$3,638,549	$3,638,549	$374,396	$374,396		
NHCRWA Transmission 2010	$80,690,624	$7,841,883	$7,841,883	$806,906	$806,906	$806,906	$806,906		
NHCRWA Transmission 2020	$172,558,512	$0	$16,770,023	$16,770,023	$1,725,585	$1,725,585	$1,725,585		
NHCRWA Transmission 2030	$0	$0	$0	$0	$0	$0	$0		
WHCRWA Internal Distribution	$552,472,000	$13,149,945	$46,238,371	$41,894,891	$12,211,165	$5,524,720	$5,524,720	WHCRWA Summary	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
WHCRWA 2020 Shared Transmission (w/ NFBWA)	$290,084,193	$4,384,014	$28,191,704	$24,258,792	$2,900,842	$2,900,842	$2,900,842	WHCRWA Summary	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
Alternative Strategies									

WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Pump Stations		Connection Costs	Treatment Plants			Wells		Other Capital Costs						Total Capital Cost	Debt Service						Operations and Maintenance						Energy					
				Booster Pump Stations	Raw Water Pump Stations	Pipeline Connections	Surface Water Treatment Plants	Groundwater Treatment Plants	Direct Reuse Plants	Municipal Supply Wells	Agricultural Wells	Land and Easements	Mitigation	Capital Costs for Irrigation Conservation	Engineering, Contingencies, Financial and Legal Services	Interest During Construction	Project-Specific Capital Costs		2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	08001300002011	$0	$206,255	$0	$4,257,163	$0	$0	$0	$0	$0	$0	$0	$1,562,196	$492,112	$0	$6,517,726	$0	$0	$94,629	$198,807	$271,295	$369,438	$0	$0	$39,893	$83,816	$154,333	$239,759	$0	$0	$3,241	$6,810	$12,539	$19,480
AMES	TRINITY	LIBERTY	08067600014608	$0	$0	$0	$0	$87,198	$0	$95,160	$0	$0	$0	$0	$63,825	$20,106	$0	$266,290	$0	$4,520	$8,629	$7,807	$8,629	$10,889	$0	$2,211	$4,220	$6,029	$8,440	$11,354	$0	$1,621	$3,094	$4,420	$6,188	$8,324
ANAHUAC	NECHES-TRINITY	CHAMBERS	08001500003607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANAHUAC	TRINITY	CHAMBERS	08001500003608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	08001800002011	$199,976	$0	$68,773	$0	$54,786	$0	$59,791	$0	$48,462	$48,462	$0	$134,164	$50,179	$0	$664,594	$29,418	$38,869	$11,916	$2,465	$4,029	$16,609	$3,371	$7,992	$9,198	$9,198	$10,067	$12,821	$3,364	$5,795	$6,802	$6,728	$8,423	$10,902
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	08099800007911	$0	$0	$0	$0	$306,180	$0	$334,325	$0	$0	$0	$0	$224,177	$70,619	$0	$935,300	$0	$21,773	$52,987	$38,815	$17,874	$20,955	$0	$10,646	$25,904	$29,622	$34,645	$39,870	$0	$7,808	$19,006	$21,731	$25,414	$29,245
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	08401200008411	$539,433	$0	$184,708	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$253,449	$87,759	$0	$1,162,319	$0	$101,336	$101,336	$0	$0	$0	$0	$15,333	$15,333	$15,333	$15,333	$15,333	$0	$15,470	$15,470	$15,470	$15,470	$15,470
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	08081700002011	$0	$0	$0	$0	$11,575	$0	$12,632	$0	$0	$0	$0	$8,473	$2,669	$0	$35,349	$0	$616	$1,027	$822	$1,027	$1,644	$0	$301	$502	$703	$1,005	$1,507	$0	$221	$368	$516	$737	$1,105
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	08081700002012	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	08075900008411	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$616	$822	$205	$0	$0	$0	$301	$402	$402	$402	$402	$0	$221	$295	$295	$295	$295
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	08004200003609	$0	$0	$0	$0	$21,607	$0	$23,580	$0	$0	$0	$0	$15,815	$4,982	$0	$65,984	$0	$1,849	$2,876	$1,849	$1,849	$2,055	$0	$904	$1,407	$1,809	$2,311	$2,813	$0	$663	$1,031	$1,326	$1,694	$2,063
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	08004200010109	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$205	$1,438	$1,233	$0	$0	$0	$100	$703	$703	$703	$703	$0	$74	$516	$516	$516	$516
BAYTOWN	SAN JACINTO	HARRIS	08004200010110	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$205	$205	$0	$205	$616	$0	$100	$100	$100	$201	$402	$0	$74	$74	$74	$147	$295
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	08082200003609	$0	$165,715	$0	$3,419,851	$137,159	$0	$149,899	$0	$0	$0	$0	$1,355,418	$426,974	$0	$5,655,016	$36,546	$263,561	$284,382	$109,956	$110,911	$119,514	$17,862	$113,764	$137,942	$160,105	$184,686	$210,475	$13,112	$9,413	$12,335	$14,798	$17,385	$19,923
BEACH CITY	TRINITY	CHAMBERS	08082200003608	$0	$25,676	$0	$530,140	$24,693	$0	$26,948	$0	$0	$0	$0	$212,610	$66,975	$0	$887,042	$6,575	$46,736	$49,724	$18,169	$16,257	$12,432	$3,215	$20,140	$24,169	$27,796	$31,020	$33,035	$2,357	$1,522	$1,923	$2,292	$2,701	$2,939
BEASLEY	BRAZOS	FORT BEND	08101200007912	$0	$0	$0	$0	$6,173	$0	$6,737	$0	$0	$0	$0	$4,519	$1,423	$0	$18,853	$0	$205	$411	$616	$822	$822	$0	$100	$201	$402	$603	$804	$0	$74	$147	$295	$442	$589
BEASLEY	BRAZOS-COLORADO	FORT BEND	08101200007913	$0	$0	$0	$0	$63,277	$0	$69,054	$0	$0	$0	$0	$46,316	$14,590	$0	$193,238	$0	$2,260	$4,931	$5,547	$6,985	$9,040	$0	$1,105	$2,412	$3,818	$5,828	$8,239	$0	$810	$1,768	$2,799	$4,273	$6,041
BELLAIRE	SAN JACINTO	HARRIS	08004600010110	$2,253,087	$0	$769,828	$0	$80,245	$0	$87,581	$0	$48,462	$48,462	$0	$1,116,760	$359,709	$0	$4,764,135	$215,953	$254,871	$77,982	$79,931	$77,919	$80,557	$34,427	$44,345	$54,288	$61,082	$67,242	$74,474	$35,359	$43,880	$52,425	$59,227	$65,390	$72,634
BELLVILLE	BRAZOS	AUSTIN	08004800000812	$0	$0	$0	$0	$536,756	$0	$586,963	$0	$0	$0	$0	$393,302	$123,895	$0	$1,640,916	$0	$58,451	$96,841	$58,111	$29,992	$26,501	$0	$28,540	$47,302	$56,945	$61,968	$69,904	$0	$20,995	$34,770	$41,842	$45,525	$51,345
BLUE BELL MANOR UTILITY COMPANY	SAN JACINTO	HARRIS	08402600010110	$0	$0	$0	$0	$318,210	$0	$347,799	$0	$0	$0	$0	$233,103	$73,430	$0	$972,542	$28,752	$74,518	$56,039	$10,272	$0	$0	$14,056	$36,416	$41,440	$41,440	$41,440	$41,440	$10,313	$26,740	$30,424	$29,982	$29,613	$29,613
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	08402700008407	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS	BRAZORIA	08007200002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	08007200002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	08403000002011	$0	$0	$0	$0	$1,265,287	$0	$1,387,827	$0	$0	$0	$0	$928,590	$292,518	$0	$3,874,222	$0	$61,515	$133,231	$134,252	$132,010	$142,005	$0	$30,031	$65,019	$95,546	$129,446	$164,829	$0	$22,100	$47,882	$70,350	$95,323	$121,400
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	08403100002012	$0	$0	$0	$0	$1,577,126	$0	$1,734,784	$0	$0	$0	$0	$1,159,168	$365,153	$0	$4,836,230	$0	$77,826	$166,422	$167,846	$165,410	$175,973	$0	$37,952	$81,119	$119,762	$161,750	$205,506	$0	$27,993	$59,890	$88,398	$119,411	$151,750
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	08403200002011	$0	$0	$0	$0	$912,815	$0	$998,764	$0	$0	$0	$0	$669,052	$210,760	$0	$2,791,391	$0	$44,538	$96,036	$96,446	$95,013	$102,382	$0	$21,761	$46,916	$68,877	$93,333	$118,886	$0	$15,985	$34,475	$50,608	$68,582	$87,367
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	08403300002011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	08403400002011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	08403600010110	$597,709	$0	$205,490	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$281,120	$96,472	$0	$1,277,715	$26,170	$61,461	$51,878	$28,443	$22,085	$21,493	$2,831	$8,698	$11,455	$13,425	$15,125	$16,998	$2,824	$8,692	$11,443	$13,407	$15,101	$16,968
BROOKSHIRE	BRAZOS	WALLER	08007700023712	$0	$0	$0	$0	$808,238	$0	$884,234	$0	$0	$0	$0	$592,365	$186,603	$0	$2,471,440	$0	$25,468	$62,424	$78,421	$92,349	$111,582	$0	$12,452	$30,514	$50,776	$75,631	$105,265	$0	$9,134	$22,394	$37,274	$55,543	$77,348
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	08007800002011	$0	$0	$0	$0	$95,686	$0	$104,424	$0	$0	$0	$0	$70,038	$22,063	$0	$292,211	$0	$2,876	$8,013	$10,067	$10,684	$12,533	$0	$1,407	$3,919	$6,330	$9,144	$12,459	$0	$1,031	$2,873	$4,641	$6,704	$9,134
BUFFALO	TRINITY	LEON	08008300014508	$0	$0	$0	$0	$40,897	$0	$44,633	$0	$0	$0	$0	$29,936	$9,430	$0	$124,896	$0	$7,396	$10,889	$3,493	$0	$0	$0	$3,617	$5,325	$5,325	$5,325	$5,325	$0	$2,652	$3,904	$3,610	$3,241	$3,462
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	08008500010110	$410,590	$0	$140,768	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$192,975	$68,705	$0	$909,963	$79,335	$79,335	$0	$0	$0	$0	$11,672	$11,672	$11,672	$11,672	$11,672	$11,672	$11,737	$11,516	$11,295	$11,173	$11,001	$11,001
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	08404300010110	$591,702	$0	$203,431	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$278,297	$95,583	$0	$1,265,936	$25,431	$59,694	$50,850	$28,739	$22,381	$21,937	$2,708	$8,404	$11,161	$13,181	$14,881	$16,827	$2,701	$8,398	$11,148	$13,161	$14,856	$16,796
CENTERVILLE	TRINITY	LEON	08010500014508	$0	$0	$0	$0	$16,205	$0	$17,685	$0	$0	$0	$0	$11,861	$3,737	$0	$49,488	$0	$2,876	$4,315	$1,438	$0	$0	$0	$1,407	$2,110	$2,110	$2,110	$2,110	$0	$1,031	$1,547	$1,326	$1,179	$1,252
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	08405300010110	$103,963	$0	$35,765	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$48,905	$23,325	$0	$308,927	$0	$0	$14,634	$14,634	$12,300	$12,300	$0	$0	$912	$912	$2,957	$2,957	$0	$0	$909	$761	$2,947	$2,897
CLEAR BROOK CITY MUD WOODMEADOWS	SAN JACINTO	HARRIS	08406300010110	$0	$0	$0	$0	$29,323	$0	$32,001	$0	$0	$0	$0	$21,464	$6,761	$0	$89,549	$0	$3,698	$7,807	$4,109	$0	$0	$0	$1,809	$3,818	$3,818	$3,818	$3,818	$0	$1,326	$2,799	$2,799	$2,799	$2,799
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	08076400008411	$0	$30,868	$0	$637,414	$64,029	$0	$69,897	$0	$0	$0	$0	$280,773	$88,447	$0	$1,171,429	$17,050	$100,218	$85,080	$1,913	$0	$0	$8,338	$43,395	$44,201	$44,201	$44,201	$44,201	$6,114	$2,922	$2,988	$2,988	$2,988	$2,988
CLEVELAND	SAN JACINTO	LIBERTY	08011600014610	$0	$0	$0	$0	$145,061	$0	$158,320	$0	$0	$0	$0	$106,183	$33,449	$0	$443,014	$0	$4,931	$10,478	$10,478	$14,792	$23,215	$0	$2,411	$5,124	$7,536	$12,358	$18,889	$0	$1,768	$3,757	$5,525	$9,061	$13,849
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	08011800002011	$124,822	$0	$42,949	$0	$33,954	$0	$37,054	$0	$48,485	$48,485	$0	$83,573	$34,246	$0	$453,567	$0	$0	$15,582	$19,487	$12,599	$20,057	$0	$0	$1,999	$3,046	$5,287	$7,971	$0	$0	$1,620	$2,504	$4,420	$6,777
COLDSPRING	TRINITY	SAN JACINTO	08012200020408	$0	$0	$0	$0	$47,844	$0	$52,212	$0	$0	$0	$0	$35,019	$11,032	$0	$146,107	$0	$4,725	$8,629	$6,164	$3,493	$1,849	$0	$2,311	$4,220	$5,325	$5,928	$6,230	$0	$1,694	$3,094	$3,904	$4,346	$4,567
COLDSPRING	SAN JACINTO	SAN JACINTO	08012200020410	$0	$0	$0	$0	$13,119	$0	$14,316	$0	$0	$0	$0	$9,602	$3,025	$0	$40,062	$0	$1,438	$2,465	$1,644	$822	$411	$0	$703	$1,206	$1,507	$1,608	$1,708	$0	$516	$884	$1,105	$1,179	$1,252
CONROE	SAN JACINTO	MONTGOMERY	08013000017010	$21,728,665	$0	$6,990,676	$0	$1,273,987	$0	$1,574,779	$0	$48,485	$48,485	$0	$11,048,837	$3,488,445	$0	$46,202,360	$362,681	$1,781,720	$1,950,435	$620,991	$852,507	$1,625,422	$167,883	$405,363	$494,065	$508,966	$636,586	$781,007	$137,754	$315,507	$411,763	$426,790	$571,542	$738,762
CONSOLIDATED WSC	TRINITY	WALKER	08407100023608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$100	$0	$74	$74	$0	$0	$0
CONSUMERS WATER INC	SAN JACINTO	HARRIS	08407200010110	$721,239	$0	$247,937	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$339,212	$114,772	$0	$1,520,084	$23,363	$58,801	$57,190	$38,487	$34,059	$35,241	$2,364	$8,255	$11,871	$14,653	$17,532	$20,510	$2,357	$8,250	$11,860	$14,635	$17,508	$20,479
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	08407200017010	$0	$0	$0	$0	$304,731	$0	$332,641	$0	$0	$0	$0	$223,080	$70,273	$0	$930,725	$7,807	$18,285	$21,572	$23,626	$30,404	$39,234	$3,818	$8,942	$14,367	$20,496	$29,235	$39,680	$2,799	$6,556	$10,534	$15,028	$21,437	$29,098
COUNTY-OTHER	BRAZOS	AUSTIN	08075700800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	08075700800813	$0	$0	$0	$0	$50,930	$0	$55,580	$0	$0	$0	$0	$37,279	$11,743	$0	$155,533	$0	$5,342	$9,245	$5,547	$2,465	$2,671	$0	$2,612	$4,522	$5,325	$5,727	$6,632	$0	$1,915	$3,315	$3,904	$4,199	$4,862
COUNTY-OTHER	COLORADO	AUSTIN	08075700800814	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$616	$1,027	$411	$205	$411	$0	$301	$502	$502	$603	$703	$0	$221	$368	$368	$442	$516
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	08075702002011	$5,920,547	$0	$1,982,600	$0	$1,774,694	$339,302	$2,117,110	$0	$48,462	$48,462	$0	$4,246,989	$1,345,772	$0	$17,823,937	$638,283	$989,140	$494,676	$234,496	$233,783	$330,336	$105,111	$267,978	$373,136	$428,436	$490,733	$562,019	$116,145	$227,110	$289,234	$317,349	$336,330	$362,702
COUNTY-OTHER	BRAZOS	BRAZORIA	08075702002012	$126,423	$0	$43,482	$0	$0	$1,805	$0	$0	$48,485	$48,485	$0	$60,098	$26,851	$0	$355,629	$0	$26,322	$27,510	$2,045	$2,160	$2,638	$0	$2,855	$3,053	$3,605	$4,230	$4,453	$0	$2,848	$3,045	$3,193	$3,413	$3,634
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	08075702002013	$2,118,817	$0	$721,716	$0	$282,301	$78,509	$308,219	$0	$48,462	$48,462	$0	$1,228,347	$394,861	$0	$5,229,693	$258,949	$302,720	$87,102	$71,216	$66,245	$82,013	$41,599	$58,217	$79,920	$96,404	$114,575	$134,233	$43,020	$55,863	$66,692	$73,370	$81,523	$90,681
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	08075703603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	TRINITY	CHAMBERS	08075703603608	$0	$64,812	$0	$1,337,587	$148,680	$0	$162,531	$0	$0	$0	$0	$599,763	$188,933	$0	$2,502,306	$39,621	$218,163	$178,542	$0	$0	$0	$19,363	$94,715	$94,715	$94,715	$94,715	$94,715	$14,217	$6,122	$5,893	$5,664	$5,500	$5,435
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	08075703603609	$0	$35,027	$0	$723,265	$80,215	$0	$87,581	$0	$0	$0	$0	$324,131	$102,105	$0	$1,352,324	$21,362	$117,901	$96,539	$0	$0	$0	$10,445	$51,144	$51,144	$51,144	$51,144	$51,144	$7,661	$3,307	$3,274	$3,241	$3,176	$3,241
COUNTY-OTHER	SAN JACINTO	FORT BEND	08075707907910	$0	$943,233	$0	$18,679,957	$0	$373,594	$0	$0	$0	$0	$0	$6,998,874	$2,204,735	$0	$29,200,393	$0	$21,994	$58,675	$433,055	$1,381,443	$2,090,774	$0	$9,268	$25,867	$218,072	$715,399	$1,280,159	$0	$753	$2,071	$17,042	$55,781	$99,775
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	$0	$5,258,985	$0	$69,435,968	$1,231,319	$2,389,555	$1,383,616	$0	$0	$0	$0	$27,894,805	$8,787,222	$0	$116,381,470	$0	$11,299	$29,787	$1,996,916	$5,890,221	$8,138,451	$0	$5,526	$14,566	$1,140,569	$4,170,963	$7,678,752	$0	$4,052	$10,681	$162,333	$428,117	$704,525
COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	$0	$6,957,436	$0	$86,355,310	$1,622,107	$3,351,514	$1,883,840	$0	$0	$0	$0	$35,059,572	$11,044,216	$0	$146,273,996	$0	$56,202	$809,368	$3,458,759	$7,052,160	$9,237,873	$0	$27,445	$535,488	$2,234,571	$5,914,664	$10,336,632	$0	$20,184	$156,218	$317,136	$604,471	$941,634
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	08075707907913	$0	$0	$0	$0	$0	$30,682	$0	$0	$0	$0	$0	$10,739	$3,383	$0	$44,803	$0	$0	$1,608	$2,413	$1,953	$1,494	$0	$0	$6,000	$9,000	$13,286	$14,571	$0	$0	$344	$516	$761	$835
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	08075708408407	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	08075708408411	$0	$905,814	$0	$15,603,120	$0	$0	$0	$0	$0	$0	$0	$5,778,127	$1,820,184	$0	$24,107,245	$0	$2,101,779	$2,101,779	$0	$0	$0	$0	$1,071,101	$1,071,101	$1,071,101	$1,071,101	$1,071,101	$0	$87,056	$87,056	$87,056	$87,056	$87,056
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	08075710110109	$0	$0	$0	$0	$0	$23,462	$0	$0	$0	$0	$0	$8,212	$2,587	$0	$34,261	$0	$0	$2,987	$2,987	$0	$0	$0	$0	$11,143	$11,143	$11,143	$11,143	$0	$0	$638	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	$22,479,537	$9,940,632	$7,058,571	$98,125,522	$0	$7,916,755	$0	$0	$48,485	$48,485	$0	$50,932,356	$16,052,266	$0	$212,602,609	$0	$0	$811,456	$7,884,228	$15,942,930	$10,651,437	$0	$0	$514,834	$6,243,432	$16,003,656	$17,513,824	$0	$0	$152,953	$917,170	$1,699,427	$2,097,881
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	08075710110111	$175,378	$0	$60,265	$0	$0	$46,925	$0	$0	$48,462	$48,462	$0	$98,899	$39,070	$0	$517,461	$39,141	$39,141	$5,974	$5,974	$0	$0	$4,987	$4,987	$27,273	$27,273	$27,273	$27,273	$4,985	$0	$2,849	$1,326	$1,203	$1,326
COUNTY-OTHER	TRINITY	LEON	08075714514508	$0	$0	$0	$0	$18,520	$0	$20,211	$0	$0	$0	$0	$13,556	$4,270	$0	$56,557	$0	$4,109	$4,931	$822	$0	$0	$0	$2,010	$2,412	$2,412	$2,412	$2,412	$0	$1,473	$1,768	$1,105	$589	$810
COUNTY-OTHER	BRAZOS	LEON	08075714514512	$0	$0	$0	$0	$20,063	$0	$21,895	$0	$0	$0	$0	$14,686	$4,626	$0	$61,270	$0	$4,315	$5,342	$1,027	$0	$0	$0	$2,110	$2,612	$2,612	$2,612	$2,612	$0	$1,547	$1,915	$1,252	$737	$958
COUNTY-OTHER	NECHES	LIBERTY	08075714614606	$0	$0	$0	$0	$103,402	$0	$112,845	$0	$0	$0	$0	$75,686	$23,842	$0	$315,776	$0	$5,136	$10,067	$10,067	$10,684	$12,327	$0	$2,512	$4,923	$7,435	$10,148	$13,464	$0	$1,842	$3,610	$5,451	$7,440	$9,871
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	08075714614607	$0	$0	$0	$0	$6,945	$0	$7,579	$0	$0	$0	$0	$5,084	$1,601	$0	$21,209	$0	$205	$616	$822	$822	$822	$0	$100	$301	$502	$703	$904	$0	$74	$221	$368	$516	$663
COUNTY-OTHER	TRINITY	LIBERTY	08075714614608	$0	$0	$0	$0	$1,215,303	$0	$1,333,931	$0	$0	$0	$0	$892,232	$281,064	$0	$3,722,530	$0	$32,034	$94,979	$129,767	$138,538	$162,746	$0	$15,659	$46,385	$78,996	$113,984	$158,328	$0	$11,492	$34,107	$58,122	$83,904	$116,685
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	08075714614609	$0	$0	$0	$0	$125,778	$0	$137,267	$0	$0	$0	$0	$92,066	$29,002	$0	$384,112	$0	$6,164	$12,327	$12,327	$12,944	$14,998	$0	$3,014	$6,029	$9,043	$12,359	$16,378	$0	$2,210	$4,420	$6,630	$9,061	$12,007
COUNTY-OTHER	SAN JACINTO	LIBERTY	08075714614610	$0	$0	$0	$0	$872,146	$0	$954,131	$0	$0	$0	$0	$639,197	$201,355	$0	$2,666,829	$0	$43,104	$84,774	$84,979	$89,895	$104,423	$0	$21,062	$41,425	$62,587	$85,347	$113,588	$0	$15,470	$30,424	$45,967	$62,689	$83,462
COUNTY-OTHER	TRINITY	MADISON	08075715715708	$0	$0	$0	$0	$127,309	$0	$138,951	$0	$0	$0	$0	$93,191	$29,356	$0	$388,808	$0	$12,532	$21,777	$9,245	$0	$12,121	$0	$6,128	$10,650	$10,650	$10,650	$16,577	$0	$4,494	$7,808	$5,083	$7,367	$12,155
COUNTY-OTHER	BRAZOS	MADISON	08075715715712	$0	$0	$0	$0	$12,347	$0	$13,474	$0	$0	$0	$0	$9,037	$2,847	$0	$37,705	$0	$822	$1,438	$1,027	$1,027	$1,438	$0	$402	$703	$904	$1,206	$1,608	$0	$295	$516	$663	$884	$1,179
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	08075717017010	$25,504,488	$0	$7,765,291	$0	$10,685,607	$9,218,016	$18,461,972	$0	$48,485	$48,485	$0	$25,072,381	$7,906,042	$0	$104,710,766	$711,150	$1,758,956	$2,347,447	$3,028,722	$3,698,926	$4,341,483	$299,973	$701,857	$1,859,920	$3,214,141	$4,753,426	$6,557,739	$293,850	$759,339	$1,269,763	$1,822,742	$2,084,546	$2,253,019
COUNTY-OTHER	TRINITY	POLK	08075718718708	$0	$0	$0	$0	$274,643	$0	$299,798	$0	$0	$0	$0	$201,054	$63,335	$0	$838,829	$0	$14,586	$25,474	$21,161	$27,939	$37,386	$0	$7,133	$12,458	$17,481	$26,120	$35,762	$0	$5,230	$9,134	$12,818	$19,153	$26,225
COUNTY-OTHER	TRINITY	SAN JACINTO	08075720420408	$0	$0	$0	$0	$206,595	$0	$225,690	$0	$0	$0	$0	$151,300	$47,661	$0	$631,246	$0	$35,726	$55,035	$19,309	$0	$0	$0	$17,462	$26,903	$26,903	$26,903	$26,903	$0	$12,818	$19,742	$9,134	$2,431	$0
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	08075720420410	$0	$0	$0	$0	$201,348	$0	$219,795	$0	$0	$0	$0	$147,400	$46,433	$0	$614,976	$0	$21,773	$37,797	$24,036	$12,738	$7,807	$0	$10,646	$18,481	$22,400	$24,711	$26,218	$0	$7,808	$13,554	$16,427	$18,122	$19,227
COUNTY-OTHER	TRINITY	TRINITY	08075722822808	$0	$0	$0	$0	$27,008	$0	$29,474	$0	$0	$0	$0	$19,769	$6,227	$0	$82,478	$0	$6,575	$7,191	$616	$0	$0	$0	$3,215	$3,517	$3,517	$3,517	$3,517	$0	$2,357	$2,578	$1,547	$0	$0
COUNTY-OTHER	TRINITY	WALKER	08075723623608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$100	$0	$74	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALKER	08075723623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALLER	08075723723710	$0	$0	$0	$0	$937,644	$0	$1,026,554	$0	$0	$0	$0	$687,469	$216,562	$0	$2,868,229	$0	$35,316	$79,239	$86,618	$102,984	$128,132	$0	$17,261	$38,723	$59,585	$89,020	$122,127	$0	$12,670	$28,435	$43,757	$65,415	$89,798
COUNTY-OTHER	BRAZOS	WALLER	08075723723712	$0	$0	$0	$0	$166,650	$0	$181,900	$0	$0	$0	$0	$121,992	$38,429	$0	$508,971	$0	$0	$5,753	$13,354	$22,188	$31,020	$0	$0	$2,813	$6,531	$13,664	$21,700	$0	$0	$2,063	$4,788	$10,018	$15,912
CROSBY MUD	SAN JACINTO	HARRIS	08407800010110	$0	$0	$0	$0	$20,835	$0	$22,737	$0	$0	$0	$0	$15,250	$4,804	$0	$63,627	$0	$2,876	$5,547	$2,671	$0	$0	$0	$1,407	$2,713	$2,713	$2,713	$2,713	$0	$1,031	$1,989	$1,989	$1,989	$1,989
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	08408100010110	$35,566	$0	$12,241	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$16,733	$13,187	$0	$174,651	$9,883	$11,664	$2,820	$1,930	$1,633	$1,633	$123	$419	$592	$740	$864	$1,012	$123	$417	$589	$737	$859	$1,007
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	08408100017010	$0	$0	$0	$0	$1,108,555	$0	$1,215,191	$0	$0	$0	$0	$813,311	$256,203	$0	$3,393,260	$21,157	$52,781	$68,990	$84,975	$120,548	$158,083	$10,345	$25,804	$44,066	$67,325	$102,906	$144,404	$7,587	$18,932	$32,339	$49,429	$75,654	$106,299
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	08085400017010	$387,153	$0	$133,052	$0	$66,359	$0	$72,423	$0	$48,485	$48,485	$0	$230,646	$80,576	$0	$1,067,179	$7,396	$17,668	$57,937	$48,407	$13,190	$26,966	$3,617	$8,641	$15,044	$15,168	$17,237	$19,650	$2,652	$6,335	$6,409	$6,532	$8,594	$11,001
DAISETTA	NECHES	LIBERTY	08014900014606	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$205	$411	$411	$411	$822	$0	$100	$201	$301	$402	$703	$0	$74	$147	$221	$295	$516
DAISETTA	TRINITY	LIBERTY	08014900014608	$0	$0	$0	$0	$8,489	$0	$9,263	$0	$0	$0	$0	$6,213	$1,957	$0	$25,922	$0	$411	$616	$411	$822	$1,438	$0	$201	$301	$402	$703	$1,105	$0	$147	$221	$295	$516	$810
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	08069300002011	$0	$0	$0	$0	$30,095	$0	$32,843	$0	$0	$0	$0	$22,028	$6,939	$0	$91,906	$0	$0	$1,438	$2,876	$3,698	$5,136	$0	$0	$703	$1,407	$2,512	$3,919	$0	$0	$516	$1,031	$1,842	$2,873
DAYTON	TRINITY	LIBERTY	08015200014608	$0	$0	$0	$0	$1,620,486	$0	$1,783,627	$0	$0	$0	$0	$1,191,440	$375,319	$0	$4,970,872	$0	$86,769	$167,036	$156,261	$164,184	$190,354	$0	$42,284	$81,419	$118,483	$161,453	$211,168	$0	$31,234	$60,111	$87,440	$119,190	$156,022
DEER PARK	SAN JACINTO	HARRIS	08015400010110	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$0	$411	$411	$0	$0	$0	$0	$201	$201	$201	$201	$0	$0	$147	$147	$147	$147
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	08015400010111	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$205	$411	$205	$0	$0	$0	$100	$201	$201	$201	$201	$0	$74	$147	$147	$147	$147
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	08016500008411	$868,743	$0	$297,541	$0	$373,201	$0	$411,801	$0	$48,485	$48,485	$0	$682,950	$223,058	$0	$2,954,263	$99,940	$220,826	$142,049	$25,762	$9,792	$10,978	$48,644	$67,231	$70,749	$71,513	$72,376	$73,338	$36,022	$21,240	$26,003	$26,765	$27,624	$28,582
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	08409800017010	$1,151,873	$0	$394,914	$0	$156,569	$0	$170,952	$0	$48,485	$48,485	$0	$656,008	$214,570	$0	$2,841,855	$16,845	$41,697	$131,951	$115,403	$50,489	$90,665	$8,237	$20,388	$36,680	$38,060	$45,074	$53,134	$6,041	$14,954	$16,452	$17,827	$24,850	$32,928
EL DORADO UD	SAN JACINTO	HARRIS	08410100010110	$0	$0	$0	$0	$405,540	$0	$442,959	$0	$0	$0	$0	$296,975	$93,551	$0	$1,239,025	$26,699	$66,730	$56,054	$23,625	$16,025	$17,669	$13,053	$32,616	$40,451	$44,169	$48,288	$52,810	$9,576	$23,941	$29,687	$32,413	$35,433	$38,748
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	08069500010111	$266,961	$0	$91,737	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$125,544	$47,464	$0	$628,630	$45,753	$49,018	$5,194	$3,562	$2,227	$2,227	$6,087	$6,629	$6,950	$7,221	$7,320	$7,591	$6,090	$6,630	$6,949	$7,219	$7,317	$7,587
FAIRCHILDS	BRAZOS	FORT BEND	08101900007912	$0	$296,695	$0	$6,123,080	$0	$0	$0	$0	$0	$0	$0	$2,246,921	$707,809	$0	$9,374,506	$0	$119,450	$337,921	$341,738	$289,431	$356,124	$0	$50,370	$142,646	$194,628	$264,742	$344,930	$0	$4,093	$11,590	$15,813	$21,510	$28,025
FIRST COLONY MUD #9	BRAZOS	FORT BEND	08411300007912	$755,396	$0	$259,385	$0	$299,532	$0	$328,430	$0	$48,485	$48,485	$0	$574,960	$189,039	$0	$2,503,712	$0	$70,085	$148,375	$117,396	$58,794	$30,804	$0	$34,196	$48,876	$55,378	$58,650	$60,498	$0	$25,193	$38,625	$28,410	$25,415	$25,193
FLO COMMUNITY WSC	TRINITY	LEON	08411400014508	$0	$0	$0	$0	$123,421	$0	$134,740	$0	$0	$0	$0	$90,356	$28,463	$0	$376,981	$0	$21,978	$32,867	$10,889	$0	$0	$0	$10,746	$16,071	$16,071	$16,071	$16,071	$0	$7,882	$11,786	$11,492	$10,387	$10,976
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	08411700007912	$418,853	$0	$144,027	$0	$214,234	$0	$234,112	$0	$48,485	$48,485	$0	$353,929	$119,412	$0	$1,581,536	$0	$48,511	$102,492	$76,027	$31,388	$13,347	$0	$11,848	$33,927	$37,592	$39,145	$39,811	$0	$9,699	$26,495	$19,030	$15,937	$14,611
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	08411800007912	$269,804	$0	$92,748	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$126,893	$47,892	$0	$634,307	$0	$30,012	$55,302	$25,290	$0	$0	$0	$3,469	$7,673	$7,673	$7,673	$7,673	$0	$3,462	$7,661	$7,661	$7,661	$7,661
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	08411900007912	$360,200	$0	$123,767	$0	$82,558	$0	$90,108	$0	$48,485	$48,485	$0	$229,822	$80,316	$0	$1,063,741	$0	$49,791	$92,741	$42,950	$0	$0	$0	$11,001	$20,993	$20,993	$20,993	$20,993	$0	$9,282	$18,121	$17,753	$13,996	$12,375
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	08412100007911	$870,619	$0	$298,670	$0	$402,350	$0	$442,959	$0	$48,485	$48,485	$0	$705,109	$230,038	$0	$3,046,716	$0	$94,880	$196,383	$148,080	$63,903	$22,666	$0	$46,203	$65,673	$73,417	$76,297	$77,184	$0	$34,181	$52,081	$36,563	$30,891	$29,123
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	08412200007911	$0	$1,352,305	$0	$26,842,762	$0	$531,514	$0	$0	$0	$0	$0	$10,054,303	$3,167,235	$0	$41,948,119	$0	$67,668	$1,003,947	$1,630,310	$1,614,355	$1,959,250	$0	$252,429	$665,397	$965,166	$1,370,481	$1,833,398	$0	$14,463	$48,022	$72,380	$105,317	$142,935
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	08412600007912	$380,835	$0	$130,844	$0	$88,728	$0	$96,845	$0	$48,485	$48,485	$0	$244,038	$84,795	$0	$1,123,055	$0	$52,437	$97,913	$45,476	$0	$0	$0	$11,772	$22,383	$22,383	$22,383	$22,383	$0	$9,920	$19,300	$18,785	$14,807	$13,113
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	08412700007912	$280,143	$0	$96,296	$0	$61,730	$0	$67,370	$0	$48,485	$48,485	$0	$176,939	$63,657	$0	$843,105	$0	$40,727	$72,273	$32,779	$1,233	$0	$0	$8,566	$15,402	$16,004	$16,004	$16,004	$0	$7,219	$13,407	$13,849	$10,903	$9,650
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	08412800007912	$224,960	$0	$77,349	$0	$48,614	$0	$53,054	$0	$48,485	$48,485	$0	$141,392	$52,460	$0	$694,797	$0	$34,688	$58,110	$25,887	$2,465	$0	$0	$6,899	$11,522	$12,727	$12,727	$12,727	$0	$5,820	$10,141	$11,025	$8,741	$7,710
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	08412900007912	$0	$663,755	$0	$13,633,526	$0	$0	$0	$0	$0	$0	$0	$5,004,048	$1,576,340	$0	$20,877,668	$0	$241,243	$696,478	$748,518	$681,484	$830,449	$0	$101,946	$295,758	$419,866	$584,669	$772,840	$0	$8,283	$24,031	$34,115	$47,506	$62,795
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	08413200010110	$402,585	$0	$138,457	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$189,365	$67,568	$0	$894,899	$21,440	$46,141	$35,965	$18,087	$13,053	$13,793	$2,044	$6,150	$8,023	$9,157	$10,192	$11,449	$2,038	$6,139	$8,005	$9,134	$10,166	$11,418
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	08021700002011	$820,608	$0	$281,967	$0	$224,502	$0	$245,059	$0	$48,485	$48,485	$0	$550,248	$181,255	$0	$2,400,609	$0	$32,464	$78,880	$85,384	$81,919	$91,447	$0	$6,861	$21,537	$32,192	$42,184	$52,568	$0	$5,648	$17,508	$26,471	$35,310	$44,764
FREEPORT	BRAZOS	BRAZORIA	08021700002012	$0	$0	$0	$0	$37,812	$0	$41,264	$0	$0	$0	$0	$27,677	$8,719	$0	$115,472	$0	$1,849	$4,725	$4,725	$3,698	$3,493	$0	$904	$2,311	$3,215	$4,120	$4,924	$0	$663	$1,694	$2,357	$3,020	$3,610
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	08021900008411	$0	$0	$0	$0	$30,866	$0	$33,685	$0	$0	$0	$0	$22,593	$7,117	$0	$94,262	$0	$5,753	$8,218	$2,465	$0	$0	$0	$2,813	$4,019	$4,019	$4,019	$4,019	$0	$2,063	$2,947	$2,799	$2,947	$2,947
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	08021900010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	08086900007911	$97,054	$0	$33,391	$0	$0	$155,213	$0	$0	$48,485	$48,485	$0	$99,980	$39,415	$0	$522,022	$0	$13,189	$19,760	$6,571	$15,819	$25,752	$0	$49,200	$73,714	$73,714	$74,824	$76,475	$0	$2,819	$4,223	$4,223	$5,328	$6,973
FULSHEAR	BRAZOS	FORT BEND	08086900007912	$154,141	$0	$53,017	$0	$0	$232,819	$0	$0	$48,485	$48,485	$0	$153,992	$56,429	$0	$747,367	$0	$19,783	$29,641	$9,857	$20,409	$35,518	$0	$73,800	$110,572	$110,572	$112,444	$114,955	$0	$4,228	$6,335	$6,335	$8,201	$10,706
GALENA PARK	SAN JACINTO	HARRIS	08022600010110	$99,711	$0	$34,313	$0	$1,543	$0	$1,684	$0	$48,462	$48,462	$0	$48,038	$23,048	$0	$305,262	$12,405	$12,851	$2,044	$2,638	$5,639	$11,126	$543	$617	$1,015	$1,188	$1,952	$3,037	$540	$614	$957	$1,129	$1,890	$2,971
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	08022700008411	$5,397,706	$0	$1,749,979	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$2,501,690	$795,984	$0	$10,542,328	$0	$919,128	$919,128	$0	$0	$0	$0	$152,442	$152,442	$152,442	$152,442	$152,442	$0	$178,318	$178,318	$178,318	$178,318	$178,318
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	08413500008411	$0	$0	$0	$0	$6,173	$0	$6,737	$0	$0	$0	$0	$4,519	$1,423	$0	$18,853	$0	$1,027	$1,644	$616	$0	$0	$0	$502	$804	$804	$804	$804	$0	$368	$589	$589	$589	$589
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	08413600008411	$0	$781,119	$0	$13,903,936	$3,087	$0	$3,369	$0	$0	$0	$0	$5,142,028	$1,619,805	$0	$21,453,343	$0	$1,870,194	$1,870,400	$205	$0	$0	$0	$921,573	$921,673	$921,673	$921,673	$921,673	$0	$75,097	$75,171	$75,171	$75,171	$75,171
GREEN TRAILS MUD	SAN JACINTO	HARRIS	08414300010110	$0	$0	$0	$0	$925,183	$0	$1,013,922	$0	$0	$0	$0	$678,687	$213,795	$0	$2,831,586	$45,972	$136,799	$130,653	$62,625	$46,215	$47,447	$22,460	$66,706	$86,169	$97,316	$108,765	$120,514	$16,501	$49,208	$63,499	$71,676	$80,074	$88,693
GROVETON	TRINITY	TRINITY	08025500022808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
H M W SUD	SAN JACINTO	MONTGOMERY	08414700017010	$2,969,451	$0	$1,009,509	$0	$515,669	$0	$565,910	$0	$48,485	$48,485	$0	$1,771,189	$565,867	$0	$7,494,564	$57,837	$137,698	$381,580	$305,727	$102,680	$209,986	$28,241	$67,180	$115,918	$116,583	$132,995	$151,511	$20,774	$49,503	$50,755	$51,418	$67,993	$86,728
HARDIN	TRINITY	LIBERTY	08087800014608	$0	$0	$0	$0	$76,395	$0	$83,371	$0	$0	$0	$0	$55,918	$17,615	$0	$233,299	$0	$3,904	$7,396	$7,396	$8,013	$9,040	$0	$1,909	$3,617	$5,526	$7,536	$9,947	$0	$1,400	$2,652	$4,052	$5,525	$7,293
HARDIN WSC	TRINITY	LIBERTY	08414800014608	$0	$0	$0	$0	$410,315	$0	$448,012	$0	$0	$0	$0	$300,415	$94,634	$0	$1,253,376	$0	$20,952	$41,082	$40,261	$42,314	$48,062	$0	$10,245	$20,088	$29,931	$40,778	$53,430	$0	$7,514	$14,733	$21,952	$29,908	$39,190
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	08414900010110	$21,679	$0	$7,461	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$10,199	$11,129	$0	$147,390	$12,850	$12,850	$0	$0	$0	$0	$617	$617	$617	$617	$617	$617	$614	$344	$98	$74	$74	$74
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	08415000010110	$312,559	$0	$107,262	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$146,937	$54,203	$0	$717,885	$62,589	$62,589	$0	$0	$0	$0	$8,887	$8,887	$8,887	$8,887	$8,887	$8,887	$8,913	$6,532	$6,139	$5,230	$5,181	$5,181
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	08415100010110	$289,392	$0	$99,558	$0	$6,945	$0	$7,579	$0	$48,462	$48,462	$0	$141,216	$52,401	$0	$694,016	$24,397	$31,654	$13,864	$14,319	$14,386	$14,534	$2,536	$4,074	$5,437	$6,719	$7,828	$9,135	$2,529	$3,928	$5,181	$6,458	$7,563	$8,864
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	08415300010110	$0	$0	$0	$0	$418,661	$0	$457,276	$0	$0	$0	$0	$306,578	$96,576	$0	$1,279,090	$20,952	$62,212	$58,927	$27,528	$20,134	$21,777	$10,245	$30,407	$39,046	$43,868	$48,892	$54,518	$7,514	$22,320	$28,656	$32,192	$35,875	$40,000
HARRIS COUNTY MUD #119 INWOOD NORTH	SAN JACINTO	HARRIS	08415400010110	$0	$0	$0	$0	$510,917	$0	$560,015	$0	$0	$0	$0	$374,826	$118,075	$0	$1,563,834	$43,309	$120,524	$93,033	$15,818	$0	$0	$21,162	$58,818	$66,553	$66,553	$66,553	$66,553	$15,543	$43,315	$48,987	$48,030	$47,440	$47,440
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	08415700010110	$0	$0	$0	$0	$2,314,478	$0	$2,575,227	$0	$0	$0	$0	$1,711,397	$539,112	$0	$7,140,214	$86,160	$281,814	$301,049	$183,831	$155,244	$156,872	$41,989	$135,890	$187,161	$225,409	$262,867	$301,904	$31,013	$102,615	$140,626	$168,840	$196,465	$225,268
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	08415900010110	$0	$0	$0	$0	$713,556	$0	$784,863	$0	$0	$0	$0	$524,447	$165,207	$0	$2,188,073	$62,740	$165,914	$128,026	$24,852	$0	$0	$30,627	$80,828	$92,979	$92,979	$92,979	$92,979	$22,541	$59,742	$68,656	$68,140	$68,140	$68,140
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	08416000010110	$0	$0	$0	$0	$1,179,997	$0	$1,293,509	$0	$0	$0	$0	$865,727	$272,715	$0	$3,611,947	$38,801	$133,074	$147,408	$94,805	$85,184	$87,028	$18,963	$64,872	$90,824	$111,186	$132,448	$153,710	$13,923	$47,882	$66,961	$81,915	$97,532	$113,149
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	08416100010110	$0	$0	$0	$0	$2,118,068	$0	$2,342,800	$0	$0	$0	$0	$1,561,304	$491,831	$0	$6,514,003	$60,494	$217,424	$257,072	$182,442	$166,632	$168,055	$29,534	$105,359	$154,100	$194,220	$235,325	$276,134	$21,731	$78,748	$114,844	$144,457	$174,807	$204,936
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	08416200010110	$0	$0	$0	$0	$878,020	$0	$960,868	$0	$0	$0	$0	$643,611	$202,746	$0	$2,685,244	$33,470	$109,056	$114,387	$67,347	$56,272	$57,708	$16,360	$53,226	$72,189	$86,145	$99,699	$114,356	$12,007	$39,190	$53,112	$63,352	$73,297	$84,052
HARRIS COUNTY MUD #156	SAN JACINTO	HARRIS	08416500010110	$21,679	$0	$7,461	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$10,199	$11,132	$0	$147,440	$0	$0	$12,854	$12,854	$0	$0	$0	$0	$617	$617	$617	$617	$0	$0	$614	$491	$467	$442
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	08417000010110	$0	$0	$0	$0	$768,442	$0	$840,444	$0	$0	$0	$0	$563,110	$177,387	$0	$2,349,383	$30,393	$97,419	$100,906	$58,117	$48,062	$49,294	$14,858	$47,568	$64,128	$75,978	$87,627	$100,079	$10,902	$34,991	$47,146	$55,838	$64,383	$73,518
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	08417400010110	$0	$0	$0	$0	$1,007,857	$0	$1,104,030	$0	$0	$0	$0	$739,160	$232,845	$0	$3,083,892	$39,621	$127,202	$132,119	$76,777	$63,658	$64,889	$19,363	$62,039	$83,800	$99,560	$114,918	$131,278	$14,217	$45,746	$61,731	$73,297	$84,567	$96,575
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	08417900010110	$504,783	$0	$173,374	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$237,355	$82,686	$0	$1,095,121	$29,860	$82,140	$65,024	$13,338	$594	$0	$3,444	$12,136	$14,255	$14,353	$14,353	$14,353	$3,438	$12,155	$14,266	$14,365	$14,217	$14,217
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	08418200010110	$898,592	$0	$308,209	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$422,380	$140,971	$0	$1,867,076	$59,375	$141,021	$102,366	$21,759	$1,039	$0	$8,352	$21,930	$25,374	$25,547	$25,547	$25,547	$8,373	$22,050	$25,488	$25,660	$25,414	$25,414
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	08418300010110	$0	$0	$0	$0	$459,946	$0	$503,593	$0	$0	$0	$0	$337,239	$106,234	$0	$1,407,012	$41,260	$107,879	$81,410	$14,791	$0	$0	$20,163	$52,675	$59,908	$59,908	$59,908	$59,908	$14,807	$38,748	$44,052	$43,683	$43,683	$43,683
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	08418400010110	$401,771	$0	$138,066	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$188,943	$67,435	$0	$893,139	$32,367	$69,860	$45,501	$8,008	$0	$0	$3,861	$10,094	$11,425	$11,425	$11,425	$11,425	$3,855	$10,092	$11,418	$11,271	$11,001	$11,001
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	08418500010110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,131,600	$6,131,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	08418600010110	$2,110,101	$0	$723,734	$0	$134,226	$0	$146,530	$0	$48,462	$48,462	$0	$1,090,107	$351,314	$0	$4,652,936	$95,125	$162,678	$130,655	$125,008	$117,397	$117,979	$14,300	$31,498	$47,558	$57,851	$67,078	$77,468	$14,414	$29,221	$43,045	$53,383	$62,640	$73,076
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	08418700010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	08418900010110	$311,044	$0	$107,006	$0	$17,749	$0	$19,369	$0	$48,462	$48,462	$0	$159,309	$58,100	$0	$769,500	$23,363	$32,354	$17,037	$16,201	$16,756	$18,533	$2,364	$4,654	$6,721	$8,077	$9,506	$11,157	$2,357	$4,322	$6,089	$7,440	$8,864	$10,509
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	08419000010110	$0	$0	$0	$0	$509,259	$0	$556,647	$0	$0	$0	$0	$373,067	$117,521	$0	$1,556,494	$29,367	$83,934	$75,518	$30,813	$20,134	$20,955	$14,356	$41,005	$51,250	$56,073	$61,096	$66,320	$10,534	$30,129	$37,643	$41,179	$44,862	$48,693
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	08419100010110	$0	$0	$0	$0	$437,912	$0	$478,329	$0	$0	$0	$0	$320,684	$101,020	$0	$1,337,945	$21,362	$64,057	$61,388	$29,376	$21,777	$23,215	$10,445	$31,307	$40,448	$45,673	$51,098	$57,025	$7,661	$22,983	$29,687	$33,518	$37,495	$41,842
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	08419300010110	$598,243	$0	$205,629	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$281,355	$96,550	$0	$1,278,746	$0	$13,003	$47,853	$54,980	$40,407	$43,504	$0	$641	$6,435	$9,781	$13,151	$17,012	$0	$638	$6,433	$9,773	$13,137	$16,992
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	08419500010110	$0	$0	$0	$0	$425,567	$0	$465,697	$0	$0	$0	$0	$311,942	$98,266	$0	$1,301,472	$37,161	$98,472	$76,307	$14,997	$0	$0	$18,162	$48,094	$55,427	$55,427	$55,427	$55,427	$13,333	$35,359	$40,737	$40,221	$40,516	$40,516
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	08419600010110	$443,519	$0	$152,450	$0	$6,945	$0	$7,579	$0	$48,462	$48,462	$0	$213,673	$75,225	$0	$996,316	$49,274	$56,383	$13,272	$12,096	$13,941	$18,384	$6,672	$8,185	$9,475	$10,461	$11,792	$13,517	$6,679	$8,054	$9,233	$10,215	$11,541	$13,260
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	08419700010110	$571,138	$0	$196,388	$0	$30,867	$0	$33,685	$0	$48,462	$48,462	$0	$291,227	$99,656	$0	$1,319,885	$37,228	$54,335	$30,155	$27,861	$29,923	$32,877	$4,669	$9,303	$12,334	$14,797	$17,308	$20,261	$4,665	$8,570	$11,247	$13,702	$16,207	$19,153
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	08419800010110	$664,876	$0	$228,189	$0	$8,489	$0	$9,263	$0	$48,462	$48,462	$0	$318,786	$108,337	$0	$1,434,863	$83,689	$91,983	$15,905	$16,359	$16,164	$16,756	$12,397	$14,107	$15,770	$17,224	$18,457	$20,009	$12,474	$14,045	$15,543	$16,992	$18,219	$19,766
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	08419900010110	$182,723	$0	$62,848	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$85,950	$34,991	$0	$463,435	$19,961	$36,843	$20,443	$3,561	$0	$0	$1,799	$4,605	$5,197	$5,197	$5,197	$5,197	$1,793	$4,592	$5,181	$5,132	$5,009	$5,009
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	08420000010110	$186,684	$0	$64,160	$0	$772	$0	$842	$0	$48,462	$48,462	$0	$88,360	$35,750	$0	$473,493	$38,552	$38,701	$502	$353	$742	$2,227	$4,889	$4,914	$5,039	$5,039	$5,162	$5,409	$4,886	$4,911	$5,010	$5,010	$5,132	$5,378
HEDWIG VILLAGE	SAN JACINTO	HARRIS	08026900010110	$404,853	$0	$138,839	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$190,292	$67,860	$0	$898,769	$76,429	$76,577	$445	$1,188	$891	$594	$11,189	$11,214	$11,263	$11,411	$11,411	$11,510	$11,246	$11,271	$11,320	$11,467	$11,418	$11,565
HEMPSTEAD	BRAZOS	WALLER	08027100023712	$0	$0	$0	$0	$2,658,081	$0	$2,980,291	$0	$0	$0	$0	$1,973,430	$621,656	$0	$8,233,458	$0	$96,703	$219,602	$263,180	$305,288	$357,948	$0	$47,083	$106,751	$174,702	$254,326	$346,971	$0	$34,844	$79,264	$130,092	$190,129	$260,700
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	08088100002011	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	08102500010110	$18,215	$0	$6,269	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$8,569	$10,619	$0	$140,641	$0	$9,887	$12,262	$2,375	$0	$0	$0	$123	$518	$518	$518	$518	$0	$123	$516	$467	$467	$467
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	08027900008411	$0	$63,082	$0	$1,301,933	$772	$0	$842	$0	$0	$0	$0	$478,320	$150,677	$0	$1,995,626	$0	$173,987	$173,987	$0	$0	$0	$0	$73,438	$73,438	$73,438	$73,438	$73,438	$0	$6,033	$5,959	$5,959	$5,959	$5,959
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	08077900002011	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
HOUSTON	SAN JACINTO	FORT BEND	08028500007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	08028500007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HOUSTON	SAN JACINTO	HARRIS	08028500010110	$0	$17,989,201	$0	$191,599,528	$0	$0	$0	$0	$0	$0	$0	$73,356,055	$23,108,100	$0	$306,052,884	$0	$0	$0	$5,714,153	$9,950,854	$20,968,932	$0	$0	$0	$5,058,600	$8,257,370	$26,485,078	$0	$0	$0	$409,839	$669,533	$2,167,421
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	08028500010111	$0	$0	$0	$0	$261,204	$0	$285,481	$0	$0	$0	$0	$191,340	$60,275	$0	$798,300	$0	$42,489	$69,599	$27,110	$0	$0	$0	$20,762	$34,016	$34,016	$34,016	$34,016	$0	$15,249	$24,972	$24,972	$24,972	$24,972
HOUSTON	SAN JACINTO	MONTGOMERY	08028500017010	$0	$0	$0	$0	$531,038	$0	$580,226	$0	$0	$0	$0	$388,942	$122,522	$0	$1,622,728	$0	$12,737	$35,537	$49,909	$63,246	$78,830	$0	$6,229	$17,376	$30,630	$48,292	$69,154	$0	$4,567	$12,744	$22,468	$35,433	$50,755
HUMBLE	SAN JACINTO	HARRIS	08028900010110	$3,748,402	$0	$1,279,251	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$1,759,679	$562,237	$0	$7,446,493	$128,610	$373,765	$346,849	$162,289	$112,874	$113,166	$19,874	$60,696	$77,611	$87,686	$96,379	$106,503	$20,135	$62,321	$79,411	$89,528	$98,245	$108,410
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	08029000010110	$1,219,974	$0	$417,603	$0	$36,268	$0	$39,580	$0	$48,462	$48,462	$0	$599,699	$196,829	$0	$2,606,877	$147,846	$164,485	$32,777	$31,985	$29,775	$30,809	$23,077	$27,435	$31,643	$34,277	$36,592	$39,398	$23,450	$27,158	$30,743	$33,370	$35,678	$38,477

Region H

Table 4C-2: WUG-Level Project Costs

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	$0	$36,210	$46,434	$48,138	$50,481	$53,676	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36,210	$184,197	$337,571	$488,648	$682,353
AMES	TRINITY	LIBERTY	$0	$1,818	$2,020	$2,222	$2,424	$2,828	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,170	$17,963	$20,478	$25,681	$33,395
ANAHUAC	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANAHUAC	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	$30,033	$30,033	$30,246	$30,459	$31,098	$32,376	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$66,185	$82,689	$58,162	$48,850	$53,617	$72,708
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	$4,444	$4,848	$5,252	$5,858	$6,262	$7,070	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,444	$45,075	$103,149	$96,026	$84,195	$97,140
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$132,139	$132,139	$30,803	$30,803	$30,803
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,138	$1,897	$2,041	$2,769	$4,256
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	$0	$0	$0	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$581	$581
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,138	$1,519	$902	$697	$697
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	$6,390	$14,058	$15,123	$15,975	$17,040	$18,318	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,390	$17,474	$20,437	$20,959	$22,894	$25,249
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	$112,251	$224,502	$225,780	$226,845	$230,892	$236,643	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$112,251	$224,881	$228,437	$229,297	$232,111	$237,862
BAYTOWN	SAN JACINTO	HARRIS	$6,603	$13,419	$13,419	$13,419	$13,632	$14,058	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,603	$13,798	$13,798	$13,593	$14,185	$15,371
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	$3,030	$4,040	$4,848	$5,656	$6,464	$7,272	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$70,550	$390,778	$439,507	$290,515	$319,446	$357,184
BEACH CITY	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$1,010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,147	$68,398	$75,816	$48,257	$49,978	$49,416
BEASLEY	BRAZOS	FORT BEND	$0	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$961	$1,515	$2,069	$2,417
BEASLEY	BRAZOS-COLORADO	FORT BEND	$0	$1,010	$1,212	$1,414	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,185	$10,323	$13,578	$18,702	$25,138
BELLAIRE	SAN JACINTO	HARRIS	$50,481	$53,889	$57,510	$61,131	$64,965	$69,225	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$336,221	$396,985	$242,205	$261,371	$275,516	$296,890
BELLVILLE	BRAZOS	AUSTIN	$0	$27,368	$30,789	$32,655	$33,588	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$135,354	$209,702	$189,553	$171,073	$182,893
BLUE BELL MANOR UTILITY COMPANY	SAN JACINTO	HARRIS	$6,464	$6,262	$6,262	$6,060	$6,060	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$59,585	$143,936	$134,165	$87,754	$77,113	$77,113
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	$20,837	$22,392	$23,014	$23,325	$23,325	$23,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,837	$22,392	$23,014	$23,325	$23,325	$23,636
BRAZORIA	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	$0	$22,392	$29,545	$35,454	$41,985	$49,138	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$136,038	$275,677	$335,602	$398,764	$477,372
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	$0	$29,545	$37,942	$45,717	$53,803	$62,511	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$173,316	$345,373	$421,723	$500,374	$595,740
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	$0	$16,172	$21,148	$25,502	$30,167	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$98,456	$198,575	$241,433	$287,095	$343,778
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	$5,252	$6,262	$7,070	$7,878	$8,686	$9,696	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,077	$85,113	$81,845	$63,153	$60,997	$65,155
BROOKSHIRE	BRAZOS	WALLER	$0	$15,550	$19,282	$23,325	$27,990	$33,899	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$62,604	$134,614	$189,796	$251,513	$328,094
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	$0	$3,232	$3,636	$3,838	$4,242	$4,646	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,546	$18,441	$24,876	$30,774	$38,772
BUFFALO	TRINITY	LEON	$0	$4,242	$4,444	$4,444	$4,444	$4,444	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,907	$24,562	$16,872	$13,010	$13,231
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	$27,990	$27,679	$27,368	$27,057	$27,057	$27,057	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$130,734	$130,202	$50,335	$49,902	$49,730	$49,730
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	$5,050	$5,858	$6,868	$7,676	$8,686	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,890	$82,354	$80,026	$62,756	$60,804	$65,054
CENTERVILLE	TRINITY	LEON	$0	$2,222	$2,424	$2,222	$2,222	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,536	$10,396	$7,096	$5,511	$5,584
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	$0	$8,086	$11,507	$11,507	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,086	$27,962	$27,814	$29,400	$29,350
CLEAR BROOK CITY MUD WOODMEADOWS	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,833	$14,424	$10,726	$6,617	$6,617
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	$3,232	$3,232	$3,232	$3,232	$3,232	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,734	$149,767	$135,501	$52,334	$50,421	$50,421
CLEVELAND	SAN JACINTO	LIBERTY	$0	$7,464	$15,861	$23,325	$27,057	$28,301	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,574	$35,220	$46,864	$63,268	$84,254
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	$7,242	$14,271	$17,040	$17,466	$18,318	$19,170	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,242	$14,271	$36,241	$42,502	$40,624	$53,975
COLDSPRING	TRINITY	SAN JACINTO	$0	$2,020	$2,222	$2,424	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,750	$18,165	$17,817	$16,191	$15,070
COLDSPRING	SAN JACINTO	SAN JACINTO	$0	$606	$606	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,263	$5,161	$4,862	$4,215	$3,977
CONROE	SAN JACINTO	MONTGOMERY	$152,082	$197,025	$250,062	$310,341	$389,790	$484,149	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$820,400	$2,699,614	$3,106,325	$1,867,088	$2,450,425	$3,629,339
CONSOLIDATED WSC	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379	$100	$100	$100
CONSUMERS WATER INC	SAN JACINTO	HARRIS	$7,464	$9,641	$12,129	$14,306	$16,483	$18,971	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,548	$84,947	$93,050	$82,080	$85,583	$95,201
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	$4,043	$4,354	$5,598	$6,842	$8,708	$10,885	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,467	$38,137	$52,071	$65,992	$89,784	$118,897
COUNTY-OTHER	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	$0	$3,434	$3,636	$3,838	$3,838	$3,838	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,303	$20,718	$18,614	$16,229	$18,003
COUNTY-OTHER	COLORADO	AUSTIN	$0	$404	$404	$404	$404	$404	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,542	$2,301	$1,685	$1,654	$2,034
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	$112,918	$123,826	$137,158	$148,268	$161,600	$176,144	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$972,457	$1,608,054	$1,294,204	$1,128,549	$1,222,446	$1,431,202
COUNTY-OTHER	BRAZOS	BRAZORIA	$1,414	$1,414	$1,616	$1,616	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,414	$33,439	$35,223	$10,458	$11,419	$12,543
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	$47,470	$50,298	$53,328	$55,550	$58,580	$61,812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$391,038	$467,098	$287,042	$296,540	$320,922	$368,739
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	$606	$606	$606	$404	$404	$404	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$606	$606	$606	$404	$404	$404
COUNTY-OTHER	TRINITY	CHAMBERS	$2,828	$2,626	$2,626	$2,424	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$76,029	$321,626	$281,776	$102,803	$102,639	$102,574
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	$1,818	$1,818	$1,616	$1,616	$1,616	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,286	$174,170	$152,573	$56,001	$55,936	$55,799
COUNTY-OTHER	SAN JACINTO	FORT BEND	$1,212	$1,010	$1,212	$6,868	$21,412	$37,976	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,212	$33,025	$87,824	$675,038	$2,174,035	$3,508,684
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	$5,656	$5,252	$4,242	$46,056	$138,774	$241,592	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,656	$26,129	$59,276	$3,345,874	$10,628,075	$16,763,320
COUNTY-OTHER	BRAZOS	FORT BEND	$0	$12,322	$54,338	$108,272	$215,736	$343,602	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$116,153	$1,555,411	$6,118,738	$13,787,031	$20,859,741
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,952	$11,929	$16,000	$16,900
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,259,936	$3,259,936	$1,158,157	$1,158,157	$1,158,157
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,768	$14,130	$11,143	$11,143
COUNTY-OTHER	SAN JACINTO	HARRIS	$0	$0	$166,246	$381,780	$676,700	$988,184	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,645,489	$15,426,610	$34,322,713	$31,251,326
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$49,113	$44,128	$36,096	$34,573	$28,476	$28,599
COUNTY-OTHER	TRINITY	LEON	$0	$4,040	$4,848	$3,030	$1,616	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,632	$13,959	$7,369	$4,617	$5,444
COUNTY-OTHER	BRAZOS	LEON	$0	$4,242	$4,646	$3,434	$2,020	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,214	$14,515	$8,325	$5,369	$6,196
COUNTY-OTHER	NECHES	LIBERTY	$0	$2,020	$2,222	$2,626	$2,828	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,510	$20,822	$25,579	$31,100	$38,894
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	$0	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$1,340	$1,894	$2,243	$2,591
COUNTY-OTHER	TRINITY	LIBERTY	$0	$34,946	$38,582	$42,420	$46,662	$51,914	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$94,131	$214,053	$309,305	$383,088	$489,673
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	$0	$2,424	$2,828	$3,030	$3,434	$3,838	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,812	$25,604	$31,030	$37,798	$47,221
COUNTY-OTHER	SAN JACINTO	LIBERTY	$0	$16,766	$19,190	$21,412	$24,038	$27,270	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,402	$175,813	$214,945	$261,969	$328,743
COUNTY-OTHER	TRINITY	MADISON	$0	$10,504	$10,706	$10,908	$11,110	$11,514	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,658	$50,941	$35,886	$29,127	$52,367
COUNTY-OTHER	BRAZOS	MADISON	$0	$808	$1,212	$1,212	$1,414	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,327	$3,869	$3,806	$4,531	$5,639
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	$256,944	$304,616	$430,462	$581,558	$800,324	$1,054,642	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,561,917	$3,524,768	$5,907,591	$8,647,163	$11,337,224	$14,206,883
COUNTY-OTHER	TRINITY	POLK	$0	$18,382	$19,594	$20,200	$21,008	$22,220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,331	$66,660	$71,660	$94,220	$121,593
COUNTY-OTHER	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$66,006	$101,680	$55,346	$29,334	$26,903
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	$0	$10,908	$11,716	$12,322	$12,524	$12,726	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,135	$81,548	$75,185	$68,095	$65,978
COUNTY-OTHER	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,147	$13,286	$5,680	$3,517	$3,517
COUNTY-OTHER	TRINITY	WALKER	$0	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$305	$100	$100	$100
COUNTY-OTHER	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALLER	$0	$11,312	$13,736	$16,160	$19,392	$23,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$76,559	$160,133	$206,120	$276,811	$363,287
COUNTY-OTHER	BRAZOS	WALLER	$0	$4,646	$8,484	$8,888	$9,696	$10,706	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,646	$19,113	$33,561	$55,566	$79,338
CROSBY MUD	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,314	$10,249	$7,373	$4,702	$8,123
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	$202	$404	$404	$404	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,331	$12,904	$4,406	$3,811	$3,962	$4,258
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	$11,196	$13,062	$17,416	$22,392	$29,545	$37,631	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,285	$110,579	$162,811	$224,121	$328,653	$446,417
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	$2,424	$2,626	$3,232	$3,838	$4,848	$5,858	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,089	$35,270	$82,622	$73,945	$43,869	$63,475
DAISETTA	NECHES	LIBERTY	$0	$202	$404	$606	$606	$808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$1,163	$1,539	$1,714	$2,849
DAISETTA	TRINITY	LIBERTY	$0	$404	$606	$808	$1,010	$1,212	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,163	$1,744	$1,916	$3,051	$4,565
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	$0	$2,222	$2,626	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,222	$5,283	$7,940	$10,880	$14,958
DAYTON	TRINITY	LIBERTY	$0	$40,119	$47,272	$54,114	$62,200	$71,530	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$200,406	$355,838	$416,298	$507,027	$629,074
DEER PARK	SAN JACINTO	HARRIS	$24,708	$43,878	$44,091	$44,304	$45,369	$46,647	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24,708	$43,878	$44,850	$45,063	$45,717	$46,995
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	$37,701	$67,308	$67,734	$68,160	$69,438	$71,355	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,701	$67,687	$68,493	$68,713	$69,786	$71,703
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	$41,748	$46,221	$48,351	$48,990	$49,416	$50,055	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$226,354	$355,518	$287,151	$173,030	$159,208	$162,953
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	$5,252	$6,262	$8,282	$10,706	$13,938	$17,776	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36,375	$83,301	$193,365	$181,996	$134,351	$194,503
EL DORADO UD	SAN JACINTO	HARRIS	$2,799	$9,330	$9,952	$10,885	$11,507	$12,440	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,127	$132,617	$136,144	$111,092	$111,253	$121,667
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	$6,060	$5,858	$5,656	$5,656	$5,656	$5,656	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,989	$68,135	$24,749	$23,659	$22,520	$23,061
FAIRCHILDS	BRAZOS	FORT BEND	$0	$5,858	$7,272	$8,888	$10,908	$13,332	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$179,771	$499,429	$561,067	$586,591	$742,411
FIRST COLONY MUD #9	BRAZOS	FORT BEND	$0	$26,435	$27,057	$27,990	$28,923	$29,856	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$155,909	$262,933	$229,173	$171,782	$146,350
FLO COMMUNITY WSC	TRINITY	LEON	$0	$9,641	$10,574	$10,574	$10,263	$10,574	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,247	$71,298	$49,026	$36,721	$37,621
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	$0	$10,706	$10,706	$10,706	$10,706	$10,706	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,764	$173,620	$143,356	$97,175	$78,474
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	$0	$6,464	$6,464	$6,464	$6,464	$6,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,407	$77,099	$47,087	$21,798	$21,798
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	$0	$14,306	$14,306	$14,306	$14,306	$14,306	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$84,380	$146,161	$96,002	$49,295	$47,674
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	$15,123	$30,033	$30,033	$30,033	$30,033	$30,033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,123	$205,297	$344,170	$288,093	$201,124	$159,006
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	$21,513	$30,033	$40,683	$51,333	$65,817	$82,431	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,513	$364,593	$1,758,049	$2,719,189	$3,155,970	$4,018,014
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	$0	$15,239	$15,239	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$89,368	$154,835	$101,572	$52,118	$50,424
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	$0	$11,196	$11,196	$11,196	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,707	$112,277	$73,829	$39,336	$36,850
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	$0	$5,454	$5,252	$5,252	$5,252	$5,252	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,860	$85,025	$54,892	$29,185	$25,689
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	$8,686	$11,514	$15,150	$18,786	$23,634	$29,088	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,686	$362,986	$1,031,417	$1,221,285	$1,337,293	$1,695,172
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	$3,838	$4,444	$4,848	$5,454	$6,060	$6,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,361	$62,874	$56,841	$41,832	$39,471	$43,125
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	$0	$27,690	$31,950	$35,571	$39,618	$44,304	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$72,663	$149,875	$179,618	$199,031	$233,083
FREEPORT	BRAZOS	BRAZORIA	$0	$1,917	$1,704	$1,704	$1,704	$1,704	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,333	$10,434	$12,001	$12,542	$13,731
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,629	$15,184	$9,283	$6,966	$6,966
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	$0	$2,020	$2,424	$3,030	$3,636	$4,444	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,228	$100,122	$87,539	$99,607	$113,644
FULSHEAR	BRAZOS	FORT BEND	$2,424	$3,030	$3,838	$4,444	$5,656	$6,666	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,424	$100,842	$150,385	$131,208	$146,710	$167,846
GALENA PARK	SAN JACINTO	HARRIS	$16,614	$16,614	$16,827	$16,827	$17,253	$17,892	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,102	$30,695	$20,843	$21,781	$26,734	$35,026
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,249,889	$1,249,889	$330,760	$330,760	$330,760
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,897	$3,037	$2,009	$1,393	$1,393
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,866,864	$2,867,244	$997,049	$996,844	$996,844
GREEN TRAILS MUD	SAN JACINTO	HARRIS	$10,302	$11,514	$12,928	$14,342	$15,554	$16,968	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$95,235	$264,227	$293,249	$245,959	$250,608	$273,622
GROVETON	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
H M W SUD	SAN JACINTO	MONTGOMERY	$23,004	$25,134	$30,885	$37,275	$46,434	$56,871	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$129,856	$279,515	$579,138	$511,003	$350,103	$505,096
HARDIN	TRINITY	LIBERTY	$0	$1,818	$2,020	$2,222	$2,424	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,031	$15,685	$19,196	$23,498	$28,906
HARDIN WSC	TRINITY	LIBERTY	$0	$7,474	$8,686	$9,696	$10,908	$12,322	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,185	$84,589	$101,840	$123,908	$153,004
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	$7,775	$7,464	$7,153	$7,153	$5,287	$5,287	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,856	$21,275	$7,868	$7,844	$5,978	$5,978
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	$27,051	$36,849	$36,636	$35,997	$35,997	$35,997	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$107,439	$114,856	$51,662	$50,114	$50,065	$50,065
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	$6,531	$7,464	$8,086	$9,019	$9,952	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,993	$47,120	$32,569	$36,515	$39,729	$43,729
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	$4,646	$5,252	$5,858	$6,464	$7,070	$7,676	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,357	$120,191	$132,487	$110,052	$111,971	$123,971
HARRIS COUNTY MUD #119 INWOOD NORTH	SAN JACINTO	HARRIS	$16,172	$17,105	$16,794	$16,172	$16,172	$16,172	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,186	$239,762	$225,367	$146,573	$130,165	$130,165
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	$32,655	$40,430	$47,894	$55,358	$62,822	$70,597	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$191,817	$560,749	$676,730	$633,438	$677,398	$754,641
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	$23,636	$23,636	$23,325	$23,325	$23,325	$23,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$139,544	$330,120	$312,986	$209,296	$184,444	$184,444
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	$14,617	$18,660	$22,703	$26,746	$31,100	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$86,304	$264,488	$327,896	$314,652	$346,264	$389,030
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	$22,703	$30,789	$39,186	$46,961	$55,047	$63,133	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$134,462	$432,320	$565,202	$568,080	$631,811	$712,258
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	$12,440	$15,239	$18,038	$20,837	$23,325	$26,435	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$74,277	$216,711	$257,726	$237,681	$252,593	$282,551
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	$0	$2,177	$10,885	$10,574	$10,574	$10,574	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,177	$24,970	$24,536	$11,658	$11,633
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	$11,507	$13,684	$15,861	$18,349	$20,526	$23,014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,660	$193,662	$228,041	$208,282	$220,598	$245,905
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	$14,928	$18,038	$21,148	$23,947	$27,057	$30,478	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$88,129	$253,025	$298,798	$273,581	$290,200	$323,220
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	$9,696	$9,696	$9,696	$9,696	$9,696	$9,696	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,438	$116,127	$103,240	$51,752	$38,860	$38,266
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	$26,124	$26,124	$26,124	$25,813	$25,813	$25,813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$102,224	$211,125	$179,353	$98,779	$77,813	$76,774
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	$15,550	$15,239	$14,928	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$91,780	$214,541	$200,298	$133,310	$118,519	$118,519
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	$12,129	$11,818	$11,507	$11,507	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,212	$101,864	$79,851	$42,211	$33,622	$33,622
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	$0	$0	$8,397	$13,684	$14,306	$15,239	$0	$0	$0	$0	$0	$0	$773,716	$773,716	$239,135	$239,135	$251,092	$269,881	$773,716	$773,716	$247,532	$252,819	$265,398	$285,120
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	$26,199	$32,163	$37,914	$43,665	$49,416	$55,593	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$150,038	$255,559	$259,172	$279,907	$296,531	$324,116
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	$13,062	$13,995	$14,928	$16,172	$17,105	$18,660	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,146	$55,325	$44,775	$47,890	$52,231	$58,859
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	$6,464	$7,070	$7,676	$8,282	$8,888	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,721	$162,138	$172,087	$136,347	$134,980	$145,462
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	$4,848	$5,454	$6,060	$6,666	$7,272	$8,080	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$44,316	$123,801	$137,583	$115,233	$117,642	$130,162
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	$0	$15,975	$17,892	$19,809	$21,726	$23,643	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,257	$78,613	$94,343	$88,421	$101,151
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	$13,995	$13,995	$13,995	$13,684	$13,684	$13,684	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$82,651	$195,920	$186,466	$124,329	$109,627	$109,627
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	$19,170	$19,809	$20,448	$20,874	$21,726	$22,791	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$81,795	$92,431	$52,427	$53,646	$59,000	$67,952
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	$18,105	$19,596	$20,874	$22,365	$23,856	$25,560	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$64,667	$91,805	$74,610	$78,725	$87,294	$97,852
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	$11,196	$12,440	$13,373	$14,306	$15,239	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$119,755	$132,575	$60,591	$64,882	$68,078	$73,014
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	$3,232	$3,232	$3,232	$3,030	$3,030	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$26,784	$49,272	$34,053	$16,920	$13,236	$13,236
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	$6,666	$6,868	$6,868	$6,868	$6,868	$6,868	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$54,993	$55,394	$17,419	$17,271	$17,905	$19,882
HEDWIG VILLAGE	SAN JACINTO	HARRIS	$9,292	$9,292	$9,090	$9,090	$9,090	$9,090	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$108,156	$108,354	$32,118	$33,156	$32,810	$32,759
HEMPSTEAD	BRAZOS	WALLER	$0	$37,942	$50,071	$63,444	$79,616	$98,587	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$216,572	$455,688	$631,418	$829,359	$1,064,206
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	$0	$202	$202	$404	$1,010	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$202	$404	$1,010	$1,793
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	$0	$2,020	$2,020	$2,020	$2,020	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,153	$15,316	$5,380	$3,005	$3,005
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$253,458	$253,384	$79,397	$79,397	$79,397
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581
HOUSTON	SAN JACINTO	FORT BEND	$54,954	$63,048	$72,633	$82,857	$96,702	$113,316	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$54,954	$63,048	$72,633	$82,857	$96,702	$113,316
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	$38,553	$44,304	$51,120	$58,149	$67,947	$79,662	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,553	$44,304	$51,120	$58,149	$67,947	$79,662
HOUSTON	SAN JACINTO	HARRIS	$4,885,794	$5,385,492	$5,851,962	$6,332,703	$6,841,986	$7,391,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,885,794	$5,385,492	$5,851,962	$17,515,295	$25,719,743	$57,013,383
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	$272,214	$300,117	$326,103	$352,941	$381,270	$411,942	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$272,214	$378,617	$454,690	$439,039	$440,258	$470,930
HOUSTON	SAN JACINTO	MONTGOMERY	$2,556	$2,769	$5,112	$7,029	$9,585	$12,567	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,556	$26,302	$70,769	$110,036	$156,556	$211,306
HUMBLE	SAN JACINTO	HARRIS	$49,416	$54,954	$60,279	$65,604	$71,142	$77,106	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$218,035	$551,736	$564,150	$405,108	$378,640	$405,184
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	$32,344	$34,521	$36,698	$38,875	$41,052	$43,229	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$226,717	$253,599	$131,860	$138,507	$143,096	$151,912

Region H
Table 4C-2: WUG-Level Project Costs

				Pump Stations		Connection Costs	Treatment Plants			Wells		Other Capital Costs							Debt Service						Operations and Maintenance						Energy					
WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Booster Pump Stations	Raw Water Pump Stations	Pipeline Connections	Surface Water Treatment Plants	Groundwater Treatment Plants	Direct Reuse Plants	Municipal Supply Wells	Agricultural Wells	Land and Easements	Mitigation	Capital Costs for Irrigation Conservation	Engineering, Contingencies, Financial and Legal Services	Interest During Construction	Project-Specific Capital Costs	Total Capital Cost	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
HUNTSVILLE	TRINITY	WALKER	08029200023608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HUNTSVILLE	SAN JACINTO	WALKER	08029200023610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	08088500002011	$0	$0	$0	$0	$30,096	$0	$32,843	$0	$0	$0	$0	$22,028	$6,939	$0	$91,906	$0	$616	$2,260	$3,493	$3,698	$3,904	$0	$301	$1,105	$2,010	$2,914	$3,919	$0	$221	$810	$1,473	$2,136	$2,873
IRRIGATION	BRAZOS	AUSTIN	08100400800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	08100400800813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	08100402002011	$0	$0	$0	$0	$0	$0	$0	$2,330,309	$0	$0	$183,981	$815,608	$131,090	$0	$3,460,989	$0	$0	$285,704	$285,704	$0	$0	$0	$0	$32,770	$32,770	$32,770	$32,770	$0	$0	$77,725	$34,459	$31,299	$4,387
IRRIGATION	BRAZOS	BRAZORIA	08100402002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,140	$0	$0	$0	$6,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	08100402002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,134	$0	$0	$0	$8,134	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES-TRINITY	CHAMBERS	08100403603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$197,489	$0	$0	$0	$197,489	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	CHAMBERS	08100403603608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$77,654	$0	$0	$0	$77,654	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	08100403603609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,187	$0	$0	$0	$4,187	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	FORT BEND	08100407907910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	08100407907911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,427	$0	$0	$0	$37,427	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS	FORT BEND	08100407907912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,116	$0	$0	$0	$19,116	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	FORT BEND	08100407907913	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,168	$0	$0	$0	$5,168	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	08100408408411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,422	$0	$0	$0	$29,422	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	08100410110109	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	HARRIS	08100410110110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES	LIBERTY	08100414614606	$0	$0	$0	$0	$0	$0	$0	$38,284	$0	$0	$7,548	$13,399	$2,154	$0	$61,385	$0	$722	$1,444	$1,384	$1,384	$2,588	$0	$83	$166	$242	$324	$538	$0	$196	$393	$573	$769	$1,277
IRRIGATION	NECHES-TRINITY	LIBERTY	08100414614607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,876	$0	$0	$0	$18,876	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	LIBERTY	08100414614608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$120,774	$0	$0	$0	$120,774	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$39,631	$0	$0	$0	$39,631	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	LIBERTY	08100414614610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,889	$0	$0	$0	$1,889	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	MADISON	08100415715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	MONTGOMERY	08100417017010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	TRINITY	08100422822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	WALKER	08100423623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALKER	08100423623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALLER	08100423723710	$0	$0	$0	$0	$0	$0	$0	$232,638	$0	$0	$0	$81,423	$13,087	$0	$327,148	$0	$28,522	$28,522	$0	$0	$0	$0	$3,271	$3,271	$3,271	$3,271	$3,271	$0	$7,759	$0	$213	$0	$0
IRRIGATION	BRAZOS	WALLER	08100423723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	LEON	08100414514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	SAN JACINTO	08100420420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
JACINTO CITY	SAN JACINTO	HARRIS	08030100010110	$93,569	$0	$32,189	$0	$16,977	$0	$18,527	$0	$48,485	$48,485	$0	$56,442	$25,699	$0	$340,374	$0	$1,849	$4,520	$2,671	$13,151	$25,155	$0	$904	$2,211	$2,211	$2,876	$4,872	$0	$663	$1,621	$1,621	$2,284	$4,273
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	08088600008411	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$822	$1,438	$616	$0	$0	$0	$402	$703	$703	$703	$703	$0	$295	$516	$516	$516	$516
JERSEY VILLAGE	SAN JACINTO	HARRIS	08070900010110	$1,378,656	$0	$473,251	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$648,167	$212,101	$0	$2,809,145	$0	$62,739	$122,022	$100,003	$80,853	$82,172	$0	$8,911	$18,768	$25,538	$32,210	$39,199	$0	$8,938	$18,834	$25,611	$32,290	$39,288
JEWETT	TRINITY	LEON	08088700014508	$0	$0	$0	$0	$31,638	$0	$34,527	$0	$0	$0	$0	$23,158	$7,295	$0	$96,618	$0	$5,342	$8,424	$3,082	$0	$0	$0	$2,612	$4,120	$4,120	$4,120	$4,120	$0	$1,915	$3,020	$2,947	$2,726	$2,873
JEWETT	BRAZOS	LEON	08088700014512	$0	$0	$0	$0	$10,032	$0	$10,948	$0	$0	$0	$0	$7,343	$2,313	$0	$30,635	$0	$1,849	$2,671	$822	$0	$0	$0	$904	$1,306	$1,306	$1,306	$1,306	$0	$663	$958	$958	$884	$958
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	08030800002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KATY	SAN JACINTO	FORT BEND	08031200007910	$0	$0	$0	$0	$589,031	$0	$643,386	$0	$0	$0	$0	$431,346	$135,879	$0	$1,799,642	$13,970	$48,875	$59,142	$46,010	$50,319	$62,016	$6,831	$23,892	$35,742	$46,388	$60,344	$76,704	$5,009	$17,532	$26,225	$34,033	$44,273	$56,280
KATY	SAN JACINTO	HARRIS	08031200010110	$0	$0	$0	$0	$3,867,194	$0	$4,443,067	$0	$0	$0	$0	$2,908,591	$916,244	$0	$12,135,096	$153,373	$486,547	$511,902	$309,435	$259,015	$262,011	$74,148	$229,447	$315,489	$378,885	$441,137	$505,961	$55,691	$181,363	$246,557	$293,850	$340,259	$388,657
KATY	SAN JACINTO	WALLER	08031200023710	$0	$0	$0	$0	$745,877	$0	$815,180	$0	$0	$0	$0	$546,370	$172,114	$0	$2,279,540	$13,353	$52,974	$70,629	$63,248	$70,220	$82,519	$6,530	$25,893	$41,051	$56,810	$75,372	$97,134	$4,788	$19,006	$30,129	$41,694	$55,322	$71,308
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	08031600008411	$213,505	$0	$73,382	$0	$131,780	$0	$144,004	$0	$48,485	$48,485	$0	$196,935	$69,957	$0	$926,533	$35,111	$74,991	$43,145	$4,304	$1,633	$1,485	$17,161	$22,271	$22,813	$22,986	$23,085	$23,233	$12,597	$5,402	$6,164	$6,336	$6,434	$6,581
KENEFICK	TRINITY	LIBERTY	08103300014608	$0	$0	$0	$0	$68,679	$0	$74,949	$0	$0	$0	$0	$50,270	$15,836	$0	$209,734	$0	$3,698	$6,985	$6,575	$6,985	$8,013	$0	$1,809	$3,416	$5,024	$6,833	$8,943	$0	$1,326	$2,505	$3,683	$5,009	$6,556
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	08034200008411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	08034600010111	$0	$0	$0	$0	$54,786	$0	$59,791	$0	$0	$0	$0	$40,102	$12,633	$0	$167,312	$0	$6,780	$14,587	$7,807	$0	$0	$0	$3,316	$7,134	$7,134	$7,134	$7,134	$0	$2,431	$5,230	$5,230	$5,230	$5,230
LA PORTE	SAN JACINTO	HARRIS	08034600010110	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$411	$822	$411	$0	$0	$0	$201	$402	$402	$402	$402	$0	$147	$295	$295	$295	$295
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	08033800002011	$1,462,663	$0	$501,447	$0	$400,637	$0	$438,749	$0	$48,462	$48,462	$0	$981,224	$317,014	$0	$4,198,657	$117,728	$185,978	$109,746	$81,038	$85,218	$99,041	$18,062	$51,367	$67,541	$76,436	$84,494	$93,765	$18,269	$41,915	$55,225	$63,180	$71,062	$80,196
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	LIBERTY	08422600014608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$233,055	$233,055	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	POLK	08422600018708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,912,990	$1,912,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	SAN JACINTO	SAN JACINTO	08422600020410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$203,923	$203,923	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	SAN JACINTO	08422600020408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$443,451	$443,451	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	TRINITY	08422600022808	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$233,055	$237,768	$0	$411	$411	$0	$0	$0	$0	$201	$201	$201	$201	$201	$0	$147	$74	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	WALKER	08422600023608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$61,501	$63,857	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$0	$0	$74	$0	$0	$0
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	08035000008411	$3,334,197	$0	$1,119,700	$0	$1,762,216	$0	$2,387,433	$0	$48,485	$48,485	$0	$3,011,241	$956,499	$0	$12,668,256	$528,299	$1,014,701	$538,244	$62,514	$23,121	$27,261	$234,482	$314,109	$322,728	$324,502	$326,571	$329,033	$208,840	$91,246	$102,984	$104,751	$106,814	$109,270
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	08035000010111	$13,878	$0	$4,776	$0	$11,575	$0	$12,632	$0	$48,485	$48,485	$0	$15,001	$12,645	$0	$167,477	$3,082	$14,453	$11,371	$0	$148	$148	$1,507	$1,877	$1,877	$1,877	$1,902	$1,902	$1,105	$368	$368	$368	$393	$393
LIBERTY	TRINITY	LIBERTY	08035600014608	$0	$0	$0	$0	$91,824	$0	$100,213	$0	$0	$0	$0	$67,213	$21,173	$0	$280,423	$0	$3,698	$4,725	$3,287	$9,451	$17,463	$0	$1,809	$2,311	$3,416	$6,933	$11,956	$0	$1,326	$1,694	$2,505	$5,083	$8,766
LIVESTOCK	BRAZOS	AUSTIN	08100500800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	08100500800813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	COLORADO	AUSTIN	08100500800814	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	08100502002011	$0	$0	$0	$0	$0	$0	$0	$19,632	$0	$0	$0	$6,871	$1,104	$0	$27,608	$0	$2,407	$2,407	$0	$0	$0	$0	$276	$276	$276	$276	$276	$0	$655	$442	$442	$442	$442
LIVESTOCK	BRAZOS	BRAZORIA	08100502002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	08100502002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	CHAMBERS	08100503603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	CHAMBERS	08100503603608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	08100503603609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	FORT BEND	08100507907910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	08100507907911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	FORT BEND	08100507907912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	08100507907913	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	GALVESTON	08100508408407	$0	$0	$0	$0	$0	$0	$0	$6,871	$0	$0	$0	$2,405	$387	$0	$9,662	$842	$842	$0	$0	$0	$0	$97	$97	$97	$97	$97	$97	$229	$229	$229	$229	$229	$229
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	08100508408411	$0	$0	$0	$0	$0	$0	$0	$12,761	$0	$0	$0	$4,466	$718	$0	$17,945	$0	$602	$1,565	$963	$0	$0	$0	$69	$179	$179	$179	$179	$0	$164	$426	$426	$426	$426
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	08100510110109	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	HARRIS	08100510110110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	08100510110111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LEON	08100514514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	LEON	08100514514512	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES	LIBERTY	08100514614606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	LIBERTY	08100514614607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LIBERTY	08100514614608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	08100514614609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	LIBERTY	08100514614610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	MADISON	08100515715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	MADISON	08100515715712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	MONTGOMERY	08100517017010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	POLK	08100518718708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	SAN JACINTO	08100520420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	SAN JACINTO	08100520420410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	TRINITY	08100522822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	WALKER	08100523623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALKER	08100523623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALLER	08100523723710	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	WALLER	08100523723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVINGSTON	TRINITY	POLK	08036200018708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	08423500010110	$0	$0	$0	$0	$1,227,416	$0	$1,344,878	$0	$0	$0	$0	$900,303	$283,607	$0	$3,756,204	$34,290	$117,607	$141,358	$108,926	$101,360	$100,950	$16,761	$57,373	$85,714	$110,569	$135,225	$159,881	$12,302	$42,284	$63,131	$81,400	$99,521	$117,643
MADISONVILLE	TRINITY	MADISON	08038200015708	$0	$0	$0	$0	$98,000	$0	$106,950	$0	$0	$0	$0	$71,733	$22,597	$0	$299,280	$0	$6,985	$11,505	$8,424	$9,040	$10,684	$0	$3,416	$5,627	$7,536	$10,048	$12,761	$0	$2,505	$4,125	$5,525	$7,367	$9,355
MAGNOLIA	SAN JACINTO	MONTGOMERY	08090700017010	$0	$0	$0	$0	$936,550	$0	$1,024,870	$0	$0	$0	$0	$686,497	$216,255	$0	$2,864,172	$15,818	$47,647	$70,220	$80,061	$97,463	$122,004	$7,735	$23,294	$42,056	$62,419	$89,665	$121,979	$5,672	$17,090	$30,866	$45,820	$65,857	$89,650
MANUFACTURING	BRAZOS	AUSTIN	08100100800812	$0	$0	$0	$0	$65,592	$0	$71,581	$0	$0	$0	$0	$48,011	$15,124	$0	$200,307	$0	$3,904	$7,396	$6,575	$5,753	$6,985	$0	$1,909	$3,617	$5,124	$6,431	$8,541	$0	$1,400	$2,652	$3,757	$4,715	$6,262
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	08100100800813	$0	$0	$0	$0	$13,890	$0	$15,158	$0	$0	$0	$0	$10,167	$3,203	$0	$42,418	$0	$822	$1,438	$1,438	$1,438	$1,438	$0	$402	$703	$1,105	$1,407	$1,809	$0	$295	$516	$810	$1,031	$1,326
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	$3,644,046	$2,731,697	$1,222,594	$49,439,558	$2,804,305	$0	$3,210,192	$0	$48,485	$48,485	$0	$22,068,337	$6,959,729	$0	$92,177,429	$0	$2,370,449	$4,028,246	$3,272,745	$2,210,556	$2,393,255	$0	$1,168,633	$1,937,869	$2,690,118	$2,821,157	$3,687,987	$0	$140,069	$276,072	$407,007	$499,744	$652,443
MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	$13,538,046	$33,876,859	$4,027,921	$369,291,305	$7,361,085	$0	$20,982,461	$0	$48,462	$48,462	$0	$157,177,187	$49,520,751	$0	$655,872,540	$9,753,256	$33,858,812	$32,175,236	$16,149,095	$10,267,726	$7,174,049	$6,637,934	$34,156,066	$42,246,760	$50,349,995	$50,720,738	$54,855,510	$2,291,784	$2,633,278	$3,284,788	$3,940,161	$4,285,142	$4,987,382
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	08100102002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	08100103603609	$0	$4,491,370	$0	$66,751,089	$151,774	$0	$165,899	$0	$0	$0	$0	$25,046,046	$7,889,827	$0	$104,496,005	$4,345,056	$5,270,803	$1,860,744	$1,877,139	$1,820,188	$1,962,497	$3,333,154	$3,741,518	$4,153,880	$4,569,668	$4,954,841	$5,440,315	$270,563	$316,260	$350,162	$383,361	$412,082	$450,428
MANUFACTURING	SAN JACINTO	FORT BEND	08100107907910	$0	$482,441	$0	$9,822,969	$0	$0	$0	$0	$0	$0	$0	$3,606,894	$1,136,218	$0	$15,048,522	$0	$585,503	$1,212,559	$686,335	$99,440	$40,161	$0	$251,022	$520,577	$545,561	$562,485	$562,485	$0	$20,397	$42,300	$44,330	$45,705	$42,464
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	08100107907911	$872,503	$0	$299,107	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$410,064	$137,095	$0	$1,815,738	$0	$31,044	$129,863	$115,995	$28,442	$11,264	$0	$3,640	$20,076	$22,931	$24,804	$24,804	$0	$3,634	$20,233	$23,082	$24,948	$24,948
MANUFACTURING	BRAZOS	FORT BEND	08100107907912	$0	$163,054	$0	$3,352,344	$0	$0	$0	$0	$0	$0	$0	$1,230,389	$387,588	$0	$5,133,375	$0	$0	$385,396	$422,688	$62,155	$24,863	$0	$0	$163,594	$179,309	$189,786	$189,786	$0	$0	$13,292	$14,569	$15,421	$13,816
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	08100108408411	$0	$0	$0	$0	$463,826	$0	$508,645	$0	$0	$0	$0	$340,365	$107,219	$0	$1,420,055	$0	$47,610	$123,807	$76,197	$0	$0	$0	$23,259	$60,422	$60,422	$60,422	$60,422	$0	$17,090	$44,494	$44,494	$44,494	$44,494
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	08100110110109	$0	$12,086,880	$0	$145,435,293	$744,744	$0	$821,917	$0	$0	$0	$0	$55,681,092	$17,540,260	$0	$232,310,185	$9,019,139	$12,257,260	$6,154,961	$5,712,092	$5,079,760	$2,284,507	$9,308,600	$11,273,066	$12,943,953	$14,544,007	$15,741,585	$15,741,585	$753,282	$947,561	$1,112,734	$1,242,778	$1,340,114	$1,291,266
MANUFACTURING	SAN JACINTO	HARRIS	08100110110110	$0	$0	$0	$0	$4,038,752	$0	$5,805,630	$0	$0	$0	$0	$3,445,534	$1,085,387	$0	$14,375,304	$0	$670,718	$1,253,305	$582,586	$0	$0	$0	$286,203	$541,001	$541,001	$541,001	$541,001	$0	$274,476	$507,847	$507,847	$507,847	$507,847
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	08100110110111	$0	$8,733,451	$0	$113,672,155	$687,166	$0	$757,073	$0	$0	$0	$0	$43,347,446	$13,655,003	$0	$180,852,293	$3,023,153	$6,097,834	$5,847,936	$8,593,334	$6,896,437	$1,076,359	$1,807,618	$3,618,441	$5,169,035	$10,362,873	$10,844,319	$10,844,319	$146,904	$325,943	$479,044	$899,785	$938,910	$893,270
MANUFACTURING	TRINITY	LEON	08100114514508	$0	$0	$0	$0	$461,928	$0	$504,435	$0	$0	$0	$0	$338,227	$106,546	$0	$1,411,136	$0	$26,289	$51,962	$51,552	$49,294	$45,188	$0	$12,853	$25,405	$38,057	$49,505	$60,151	$0	$9,429	$18,637	$27,919	$36,317	$44,125
MANUFACTURING	TRINITY	LIBERTY	08100114614608	$0	$0	$0	$0	$42,442	$0	$46,317	$0	$0	$0	$0	$31,066	$9,786	$0	$129,611	$0	$2,465	$4,725	$4,725	$4,725	$4,109	$0	$1,206	$2,311	$3,517	$4,622	$5,526	$0	$884	$1,694	$2,578	$3,389	$4,052
MANUFACTURING	SAN JACINTO	LIBERTY	08100114614610	$0	$0	$0	$0	$222,210	$0	$242,533	$0	$0	$0	$0	$162,660	$51,240	$0	$678,643	$0	$12,326	$24,858	$25,269	$24,242	$21,572	$0	$6,028	$12,156	$18,385	$24,011	$28,934	$0	$4,420	$8,913	$13,481	$17,606	$21,216
MANUFACTURING	TRINITY	MADISON	08100115715708	$0	$0	$0	$0	$106,488	$0	$116,214	$0	$0	$0	$0	$77,946	$24,554	$0	$325,202	$0	$5,958	$11,505	$11,095	$10,478	$11,300	$0	$2,914	$5,627	$8,340	$10,751	$13,866	$0	$2,136	$4,125	$6,114	$7,882	$10,166
MANUFACTURING	SAN JACINTO	MONTGOMERY	08100117017010	$0	$0	$0	$0	$1,915,921	$0	$2,108,689	$0	$0	$0	$0	$1,408,613	$443,731	$0	$5,876,954	$95,893	$201,893	$187,080	$157,278	$152,598	$153,209	$46,692	$98,254	$137,783	$174,946	$212,207	$249,666	$34,549	$72,781	$101,952	$129,356	$156,833	$184,457
MANUFACTURING	SAN JACINTO	SAN JACINTO	08100120420410	$0	$0	$0	$0	$15,434	$0	$16,843	$0	$0	$0	$0	$11,297	$3,559	$0	$47,131	$0	$822	$1,644	$1,644	$1,438	$1,644	$0	$402	$804	$1,206	$1,507	$2,010	$0	$295	$589	$884	$1,105	$1,473
MANUFACTURING	TRINITY	WALKER	08100123623608	$0	$0	$0	$0	$1,639,607	$0	$1,814,786	$0	$0	$0	$0	$1,209,037	$380,862	$0	$5,044,293	$0	$127,707	$269,380	$180,884	$101,134	$131,193	$0	$61,965	$130,577	$149,740	$179,969	$213,770	$0	$46,188	$97,532	$111,602	$133,849	$158,748
MANUFACTURING	SAN JACINTO	WALKER	08100123623610	$0	$0	$0	$0	$320,916	$0	$350,325	$0	$0	$0	$0	$234,935	$74,007	$0	$980,184	$0	$18,899	$36,154	$34,922	$33,074	$31,636	$0	$9,241	$17,679	$26,318	$33,852	$41,788	$0	$6,777	$12,965	$19,300	$24,825	$30,645
MANUFACTURING	SAN JACINTO	WALLER	08100123723710	$0	$0	$0	$0	$33,954	$0	$37,054	$0	$0	$0	$0	$24,853	$7,829	$0	$103,689	$0	$2,055	$3,904	$3,493	$3,493	$3,493	$0	$1,005	$1,909	$2,713	$3,617	$4,421	$0	$737	$1,400	$1,989	$2,652	$3,241
MANUFACTURING	BRAZOS	WALLER	08100123723712	$0	$0	$0	$0	$8,489	$0	$9,263	$0	$0	$0	$0	$6,213	$1,957	$0	$25,922	$0	$411	$822	$1,027	$822	$822	$0	$201	$402	$703	$804	$1,105	$0	$147	$295	$516	$589	$810
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	08072100002011	$0	$17,693	$0	$365,346	$19,292	$0	$21,053	$0	$0	$0	$0	$148,184	$46,680	$0	$618,248	$0	$51,578	$51,989	$411	$0	$1,913	$0	$22,056	$22,257	$22,257	$22,257	$23,063	$0	$3,298	$3,283	$3,094	$2,898	$2,775
MASON CREEK UD	SAN JACINTO	HARRIS	08424700010110	$0	$0	$0	$0	$1,274,700	$0	$1,428,249	$0	$0	$0	$0	$946,032	$298,012	$0	$3,946,994	$115,469	$301,218	$228,648	$42,899	$0	$0	$56,110	$145,420	$166,382	$166,382	$166,382	$166,382	$41,694	$109,540	$124,936	$123,905	$123,315	$123,315
MEADOWS	SAN JACINTO	FORT BEND	08079200007910	$852,543	$0	$292,233	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$400,672	$134,136	$0	$1,776,554	$0	$74,834	$154,888	$80,054	$0	$0	$0	$10,923	$24,236	$24,236	$24,236	$24,236	$0	$10,976	$24,383	$24,383	$24,383	$24,383
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	08079200007911	$85,803	$0	$29,522	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$40,364	$20,635	$0	$273,293	$0	$15,671	$23,827	$8,156	$0	$0	$0	$1,085	$2,440	$2,440	$2,440	$2,440	$0	$1,080	$2,431	$2,431	$2,431	$2,431
MERCY WSC	SAN JACINTO	LIBERTY	08425300014610	$0	$0	$0	$0	$51,702	$0	$56,423	$0	$0	$0	$0	$37,844	$11,921	$0	$157,890	$0	$2,671	$5,136	$5,136	$5,342	$5,958	$0	$1,306	$2,512	$3,818	$5,124	$6,732	$0	$958	$1,842	$2,799	$3,757	$4,936
MERCY WSC	SAN JACINTO	SAN JACINTO	08425300020410	$0	$0	$0	$0	$135,028	$0	$147,372	$0	$0	$0	$0	$98,840	$31,136	$0	$412,377	$0	$13,559	$24,037	$17,052	$10,067	$5,342	$0	$6,631	$11,755	$14,970	$16,678	$17,582	$0	$4,862	$8,619	$10,976	$12,228	$12,891
MINING	BRAZOS	AUSTIN	08100300800812	$0	$0	$0	$0	$10,032	$0	$10,948	$0	$0	$0	$0	$7,343	$2,313	$0	$30,635	$0	$822	$1,438	$1,027	$822	$822	$0	$402	$703	$904	$1,105	$1,306	$0	$295	$516	$663	$810	$958
MINING	BRAZOS-COLORADO	AUSTIN	08100300800813	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
MINING	COLORADO	AUSTIN	08100300800814	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$205	$205	$205	$205	$0	$0	$100	$100	$201	$201	$201	$0	$74	$74	$147	$147	$147
MINING	SAN JACINTO-BRAZOS	BRAZORIA	08100302002011	$0	$84,647	$0	$1,747,873	$57,874	$0	$63,160	$0	$0	$0	$0	$683,744	$215,388	$0	$2,852,685	$0	$76,982	$110,601	$76,995	$91,051	$94,732	$0	$32,933	$47,433	$65,866	$86,013	$105,859	$0	$4,968	$7,718	$9,937	$11,835	$13,514
MINING	BRAZOS	BRAZORIA	08100302002012	$0	$64,860	$0	$1,339,181	$0	$0	$0	$0	$0	$0	$0	$491,414	$154,802	$0	$2,050,257	$0	$113,724	$129,981	$33,470	$33,470	$31,557	$0	$47,952	$54,803	$62,056	$68,906	$75,354	$0	$3,896	$4,453	$5,042	$5,599	$6,122
MINING	BRAZOS-COLORADO	BRAZORIA	08100302002013	$0	$331,155	$0	$6,819,659	$189,743	$0	$207,163	$0	$0	$0	$0	$2,641,702	$832,170	$0	$11,021,594	$0	$436,060	$556,033	$239,873	$261,922	$284,979	$0	$187,021	$238,284	$289,448	$349,585	$409,927	$0	$23,908	$31,283	$38,322	$44,322	$49,421
MINING	NECHES-TRINITY	CHAMBERS	08100303603607	$0	$0	$0	$0	$216,793	$0	$236,638	$0	$0	$0	$0	$158,701	$49,993	$0	$662,125	$21,362	$32,251	$17,668	$13,149	$12,944	$12,327	$10,445	$15,770	$19,086	$22,201	$25,416	$28,229	$7,661	$11,565	$13,996	$16,280	$18,637	$20,700
MINING	TRINITY	CHAMBERS	08100303603608	$0	$3,936,682	$0	$68,854,605	$447,945	$0	$489,276	$0	$0	$0	$0	$25,804,978	$8,128,900	$0	$107,662,386	$2,961,951	$4,781,894	$3,020,048	$2,381,776	$2,357,938	$2,222,827	$1,749,977	$2,635,833	$3,179,281	$3,713,366	$4,244,734	$4,711,358	$142,223	$227,126	$278,364	$328,513	$377,983	$420,946
MINING	TRINITY-SAN JACINTO	CHAMBERS	08100303603609	$0	$1,269,222	$0	$25,543,602	$465,057	$0	$514,540	$0	$0	$0	$0	$9,727,348	$3,064,240	$0	$40,584,009	$1,101,771	$1,354,815	$767,338	$1,064,306	$1,108,233	$1,119,178	$494,023	$608,159	$827,757	$1,063,066	$1,302,002	$1,542,147	$43,094	$89,503	$99,022	$113,796	$131,001	$148,304
MINING	SAN JACINTO	FORT BEND	08100307907910	$0	$60,005	$0	$1,239,066	$0	$0	$0	$0	$0	$0	$0	$454,675	$143,228	$0	$1,896,974	$0	$73,614	$157,737	$86,992	$5,738	$4,781	$0	$31,028	$66,489	$67,698	$68,906	$69,712	$0	$2,521	$5,402	$5,500	$5,599	$5,664
MINING	SAN JACINTO-BRAZOS	FORT BEND	08100307907911	$0	$255,527	$0	$5,216,843	$0	$0	$0	$0	$0	$0	$0	$1,915,329	$603,353	$0	$7,991,053	$0	$82,212	$662,270	$593,446	$24,863	$21,038	$0	$34,655	$283,260	$288,901	$293,737	$297,767	$0	$2,816	$23,016	$23,475	$23,867	$24,195
MINING	BRAZOS	FORT BEND	08100307907912	$0	$138,986	$0	$2,868,291	$0	$0	$0	$0	$0	$0	$0	$1,052,547	$331,566	$0	$4,391,391	$0	$180,445	$365,648	$190,941	$12,432	$11,475	$0	$76,158	$154,332	$156,749	$159,570	$161,585	$0	$6,188	$12,539	$12,736	$12,965	$13,129
MINING	BRAZOS-COLORADO	FORT BEND	08100307907913	$0	$0	$0	$0	$6,945	$0	$7,579	$0	$0	$0	$0	$5,084	$1,601	$0	$21,209	$0	$822	$822	$411	$616	$616	$0	$402	$402	$603	$703	$904	$0	$295	$295	$442	$516	$663
MINING	NECHES-TRINITY	GALVESTON	08100308408407	$0	$12,840	$0	$265,081	$772	$0	$842	$0	$0	$0	$0	$97,837	$30,820	$0	$408,192	$15,300	$21,994	$9,768	$5,943	$6,694	$7,650	$6,447	$9,268	$10,578	$11,786	$13,398	$15,010	$524	$753	$925	$1,023	$1,154	$1,285
MINING	SAN JACINTO-BRAZOS	GALVESTON	08100308408411	$0	$11,798	$0	$243,586	$11,575	$0	$12,632	$0	$0	$0	$0	$97,857	$30,826	$0	$408,275	$3,082	$23,164	$22,951	$6,694	$6,694	$5,738	$1,507	$9,969	$11,178	$12,790	$13,999	$15,208	$1,105	$762	$860	$991	$1,089	$1,187
MINING	SAN JACINTO	HARRIS	08100310110110	$0	$218,122	$0	$4,503,776	$18,520	$0	$20,211	$0	$0	$0	$0	$1,666,220	$524,881	$0	$6,951,731	$133,760	$264,879	$213,270	$174,870	$179,708	$166,335	$56,414	$111,918	$146,671	$185,758	$222,427	$255,873	$4,584	$10,076	$13,489	$16,665	$19,644	$22,361
MINING	SAN JACINTO-BRAZOS	HARRIS	08100310110111	$0	$4,164	$0	$85,973	$772	$0	$842	$0	$0	$0	$0	$32,113	$10,116	$0	$133,980	$2,869	$4,986	$4,030	$3,825	$2,869	$2,869	$1,209	$2,115	$2,921	$3,727	$4,130	$4,936	$98	$238	$303	$369	$401	$467
MINING	TRINITY	LEON	08100314514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	LEON	08100314514512	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	NECHES	LIBERTY	08100314614606	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
MINING	NECHES-TRINITY	LIBERTY	08100314614607	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$0	$0	$0	$0	$74	$0
MINING	TRINITY	LIBERTY	08100314614608	$0	$0	$0	$0	$206,783	$0	$225,690	$0	$0	$0	$0	$151,366	$47,682	$0	$631,522	$0	$11,710	$22,393	$20,545	$20,955	$22,804	$0	$5,727	$10,951	$15,774	$21,199	$26,926	$0	$4,199	$8,029	$11,565	$15,543	$19,742
MINING	TRINITY-SAN JACINTO	LIBERTY	08100314614609	$0	$0	$0	$0	$23,150	$0	$25,264	$0	$0	$0	$0	$16,945	$5,338	$0	$70,697	$0	$2,055	$3,082	$2,055	$2,055	$2,055	$0	$1,005	$1,507	$2,010	$2,512	$3,014	$0	$737	$1,105	$1,473	$1,842	$2,210
MINING	SAN JACINTO	LIBERTY	08100314614610	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
MINING	TRINITY	MADISON	08100315715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	MADISON	08100315715712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	MONTGOMERY	08100317017010	$0	$0	$0	$0	$327,854	$0	$357,904	$0	$0	$0	$0	$240,016	$75,608	$0	$1,001,382	$22,594	$44,367	$34,716	$23,626	$21,161	$19,312	$11,047	$21,693	$28,023	$33,247	$38,371	$42,691	$8,103	$15,912	$20,553	$24,383	$28,140	$31,308
MINING	TRINITY	POLK	08100318718708	$0	$0	$0	$0	$4,630	$0	$5,053	$0	$0	$0	$0	$3,389	$1,068	$0	$14,139	$0	$411	$616	$411	$411	$411	$0	$201	$301	$402	$502	$603	$0	$147	$221	$295	$368	$442
MINING	TRINITY	SAN JACINTO	08100320420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	SAN JACINTO	08100320420410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	TRINITY	08100322822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	WALKER	08100323623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALKER	08100323623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALLER	08100323723710	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	WALLER	08100323723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	FORT BEND	08040900007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	08040900007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	HARRIS	08040900010110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	BRAZOS	FORT BEND	08040900007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MONT BELVIEU	TRINITY	CHAMBERS	08041300003608	$0	$425,571	$0	$8,706,412	$393,311	$0	$434,538	$0	$0	$0	$0	$3,485,941	$1,098,116	$0	$14,543,889	$105,395	$739,642	$774,682	$265,610	$254,166	$262,751	$51,271	$324,048	$383,283	$436,071	$490,470	$546,884	$38,011	$24,301	$31,103	$36,939	$42,980	$49,183
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	08041300003609	$0	$184,411	$0	$3,804,733	$156,355	$0	$170,952	$0	$0	$0	$0	$1,510,758	$475,908	$0	$6,303,116	$41,670	$297,127	$319,514	$122,381	$121,425	$130,027	$20,362	$128,353	$155,351	$179,932	$206,528	$234,735	$14,954	$10,468	$13,767	$16,501	$19,251	$21,985
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	08426100017010	$6,019,471	$0	$2,025,128	$0	$1,401,173	$0	$1,574,779	$0	$48,485	$48,485	$0	$3,857,193	$1,222,985	$0	$16,197,698	$65,190	$176,835	$313,683	$714,970	$754,247	$520,384	$31,818	$86,093	$182,942	$267,015	$307,197	$353,680	$23,425	$63,720	$137,754	$90,780	$132,278	$180,577

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
HUNTSVILLE	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HUNTSVILLE	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	$0	$1,414	$1,414	$1,414	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,552	$5,589	$8,390	$10,364	$12,514
IRRIGATION	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$1,734,868	$1,734,868	$1,718,828	$1,718,828	$1,718,828	$1,718,828	$0	$0	$0	$0	$0	$0	$1,734,868	$1,734,868	$2,115,027	$2,071,761	$1,782,897	$1,755,985
IRRIGATION	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$57,898	$57,898	$57,363	$57,363	$57,363	$57,363	$0	$0	$0	$0	$0	$0	$57,898	$57,898	$57,363	$57,363	$57,363	$57,363
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$76,700	$76,700	$75,991	$75,991	$75,991	$75,991	$0	$0	$0	$0	$0	$0	$76,700	$76,700	$75,991	$75,991	$75,991	$75,991
IRRIGATION	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$1,670,977	$1,670,977	$1,653,759	$1,653,759	$1,653,759	$1,653,759	$0	$0	$0	$0	$0	$0	$1,670,977	$1,670,977	$1,653,759	$1,653,759	$1,653,759	$1,653,759
IRRIGATION	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$657,035	$657,035	$650,265	$650,265	$650,265	$650,265	$0	$0	$0	$0	$0	$0	$657,035	$657,035	$650,265	$650,265	$650,265	$650,265
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$35,425	$35,425	$35,060	$35,060	$35,060	$35,060	$0	$0	$0	$0	$0	$0	$35,425	$35,425	$35,060	$35,060	$35,060	$35,060
IRRIGATION	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$341,125	$341,125	$337,862	$337,862	$337,862	$337,862	$0	$0	$0	$0	$0	$0	$341,125	$341,125	$337,862	$337,862	$337,862	$337,862
IRRIGATION	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$174,232	$174,232	$172,565	$172,565	$162,166	$136,364	$0	$0	$0	$0	$0	$0	$174,232	$174,232	$172,565	$172,565	$162,166	$136,364
IRRIGATION	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,512	$36,704	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,512	$36,704
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$237,275	$237,275	$234,710	$234,710	$234,710	$234,710	$0	$0	$0	$0	$0	$0	$237,275	$237,275	$234,710	$234,710	$234,710	$234,710
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$84,316	$84,316	$83,658	$83,658	$83,658	$83,658	$0	$0	$0	$0	$0	$0	$84,316	$85,317	$85,661	$85,857	$86,135	$88,061
IRRIGATION	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$210,843	$210,843	$209,197	$209,197	$209,197	$209,197	$0	$0	$0	$0	$0	$0	$210,843	$210,843	$209,197	$209,197	$209,197	$209,197
IRRIGATION	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$1,349,069	$1,349,069	$1,338,539	$1,338,539	$1,338,539	$1,338,539	$0	$0	$0	$0	$0	$0	$1,349,069	$1,349,069	$1,338,539	$1,338,539	$1,338,539	$1,338,539
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$442,688	$442,688	$439,233	$439,233	$439,233	$439,233	$0	$0	$0	$0	$0	$0	$442,688	$442,688	$439,233	$439,233	$439,233	$439,233
IRRIGATION	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$21,105	$21,105	$20,940	$20,940	$20,940	$20,940	$0	$0	$0	$0	$0	$0	$21,105	$21,105	$20,940	$20,940	$20,940	$20,940
IRRIGATION	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$574,090	$574,090	$0	$0	$0	$0	$0	$0	$0	$39,552	$31,793	$3,484	$577,361	$577,361
IRRIGATION	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$152,570	$152,570	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$152,570	$152,570
IRRIGATION	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
JACINTO CITY	SAN JACINTO	HARRIS	$0	$0	$12,141	$19,596	$20,661	$21,726	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,416	$20,493	$26,099	$38,973	$56,026
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$1,835	$1,219	$1,219
JERSEY VILLAGE	SAN JACINTO	HARRIS	$0	$34,832	$40,119	$45,717	$51,004	$56,602	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$115,420	$199,743	$196,869	$196,357	$217,261
JEWETT	TRINITY	LEON	$0	$2,020	$2,222	$2,222	$2,020	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,889	$17,786	$12,371	$8,866	$9,215
JEWETT	BRAZOS	LEON	$0	$606	$808	$808	$606	$808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,022	$5,743	$3,894	$2,796	$3,072
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KATY	SAN JACINTO	FORT BEND	$3,834	$5,112	$6,603	$8,094	$10,011	$12,354	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,644	$95,411	$127,712	$134,525	$164,947	$207,354
KATY	SAN JACINTO	HARRIS	$43,239	$52,185	$61,344	$70,716	$79,662	$89,247	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$326,451	$949,542	$1,135,292	$1,052,886	$1,120,073	$1,245,876
KATY	SAN JACINTO	WALLER	$3,621	$5,538	$7,455	$9,798	$12,354	$15,549	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$28,292	$103,411	$149,264	$171,550	$213,268	$266,510
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	$3,030	$3,636	$3,838	$4,040	$4,040	$4,040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,899	$106,300	$75,960	$37,666	$35,192	$35,338
KENEFICK	TRINITY	LIBERTY	$0	$1,212	$1,414	$1,616	$1,818	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,045	$14,320	$16,898	$20,645	$25,532
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,527	$26,951	$20,171	$12,364	$12,364
LA PORTE	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,519	$1,108	$697	$697
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	$54,315	$58,575	$62,196	$66,030	$70,290	$75,615	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$208,374	$337,835	$294,708	$286,684	$311,064	$348,617
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	LIBERTY	$0	$1,491	$1,704	$1,704	$1,917	$2,130	$0	$0	$0	$0	$0	$0	$40,419	$39,858	$20,100	$20,379	$21,496	$22,333	$40,419	$41,349	$21,804	$22,083	$23,413	$24,463
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	POLK	$0	$11,502	$13,206	$13,632	$14,058	$14,910	$0	$0	$0	$0	$0	$0	$331,772	$323,913	$158,847	$158,568	$159,405	$161,080	$331,772	$335,415	$172,053	$172,200	$173,463	$175,990
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	SAN JACINTO	SAN JACINTO	$1,278	$1,491	$1,704	$1,704	$1,917	$1,917	$0	$0	$0	$0	$0	$0	$35,367	$39,296	$20,379	$20,938	$20,938	$20,658	$36,645	$40,787	$22,083	$22,642	$22,855	$22,575
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	SAN JACINTO	$2,769	$3,408	$3,621	$3,834	$4,047	$4,047	$0	$0	$0	$0	$0	$0	$76,908	$84,206	$44,388	$45,505	$45,225	$44,109	$79,677	$87,614	$48,009	$49,339	$49,272	$48,156
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	TRINITY	$0	$426	$213	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,419	$38,173	$17,867	$16,471	$15,075	$13,958	$40,419	$39,358	$18,766	$16,672	$15,276	$14,159
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	WALKER	$0	$0	$213	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,666	$10,105	$4,746	$4,467	$4,188	$4,188	$10,666	$10,105	$5,338	$4,772	$4,288	$4,288
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	$100,962	$111,399	$117,150	$118,215	$119,280	$120,771	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,072,583	$1,531,455	$1,081,106	$609,982	$575,786	$586,336
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	$426	$426	$426	$426	$426	$426	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,120	$17,124	$14,042	$2,671	$2,869	$2,869
LIBERTY	TRINITY	LIBERTY	$0	$5,598	$7,153	$10,574	$21,459	$30,167	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,431	$15,883	$19,782	$42,926	$68,352
LIVESTOCK	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,338	$3,125	$718	$718	$718
LIVESTOCK	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,168	$1,168	$326	$326	$326	$326
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$835	$2,170	$1,568	$605	$605
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVINGSTON	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	$2,556	$5,538	$7,029	$8,733	$10,437	$11,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,909	$222,802	$297,232	$309,628	$346,543	$390,402
MADISONVILLE	TRINITY	MADISON	$0	$10,574	$15,550	$15,861	$16,483	$16,794	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23,480	$36,807	$37,346	$42,938	$49,594
MAGNOLIA	SAN JACINTO	MONTGOMERY	$4,848	$6,868	$8,888	$11,312	$14,544	$18,382	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,073	$94,899	$152,030	$199,612	$267,529	$352,015
MANUFACTURING	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,213	$13,665	$15,456	$16,899	$21,788
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$3,353	$3,876	$4,573
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,679,151	$6,242,188	$6,369,870	$5,531,457	$6,733,685
MANUFACTURING	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,682,974	$70,648,156	$77,706,784	$70,439,251	$65,273,606	$67,016,941
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,948,773	$9,328,581	$6,364,786	$6,830,168	$7,187,111	$7,853,240
MANUFACTURING	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$856,922	$1,775,436	$1,276,226	$707,630	$645,110
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,319	$170,172	$162,009	$78,193	$61,016
MANUFACTURING	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$562,282	$616,566	$267,362	$228,465
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$87,959	$228,723	$181,113	$104,916	$104,916
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,081,021	$24,477,887	$20,211,648	$21,498,877	$22,161,459	$19,317,358
MANUFACTURING	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,231,397	$2,302,153	$1,631,434	$1,048,848	$1,048,848
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,977,675	$10,042,218	$11,496,015	$19,855,992	$18,679,666	$12,813,948
MANUFACTURING	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$48,571	$96,004	$117,528	$135,116	$149,464
MANUFACTURING	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,555	$8,730	$10,820	$12,736	$13,687
MANUFACTURING	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,774	$45,927	$57,135	$65,859	$71,722
MANUFACTURING	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,008	$21,257	$25,549	$29,111	$35,332
MANUFACTURING	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$177,134	$372,928	$426,815	$461,580	$521,638	$587,332
MANUFACTURING	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$3,037	$3,734	$4,050	$5,127
MANUFACTURING	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$235,860	$497,489	$442,226	$414,952	$503,711
MANUFACTURING	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,917	$66,798	$80,540	$91,751	$104,069
MANUFACTURING	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,797	$7,213	$8,195	$9,762	$11,155
MANUFACTURING	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,519	$2,246	$2,215	$2,737
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	$0	$6,390	$6,390	$6,177	$5,964	$5,964	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$83,322	$83,919	$31,939	$31,119	$33,715
MASON CREEK UD	SAN JACINTO	HARRIS	$43,540	$42,918	$42,607	$41,985	$41,985	$41,985	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$256,813	$599,096	$562,573	$375,171	$331,682	$331,682
MEADOWS	SAN JACINTO	FORT BEND	$34,832	$34,521	$34,210	$33,588	$33,588	$33,588	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,832	$131,254	$237,717	$162,261	$82,207	$82,207
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	$3,421	$3,421	$3,421	$3,421	$3,421	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,421	$21,257	$32,119	$16,448	$8,292	$8,292
MERCY WSC	SAN JACINTO	LIBERTY	$0	$1,010	$1,212	$1,212	$1,414	$1,616	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,945	$10,702	$12,965	$15,637	$19,242
MERCY WSC	SAN JACINTO	SAN JACINTO	$0	$4,444	$5,050	$5,454	$5,656	$5,656	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,496	$49,461	$48,452	$44,629	$41,471
MINING	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$2,594	$2,737	$3,086
MINING	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379
MINING	COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379	$553	$553	$348
MINING	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$114,883	$165,752	$152,798	$188,899	$214,105
MINING	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$165,572	$189,237	$100,568	$107,975	$113,033
MINING	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$646,989	$825,600	$567,643	$655,829	$744,327
MINING	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$39,468	$59,586	$50,750	$51,630	$56,997	$61,256
MINING	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,854,151	$7,644,853	$6,477,693	$6,423,655	$6,980,655	$7,355,131
MINING	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,638,888	$2,052,477	$1,694,117	$2,241,168	$2,541,236	$2,809,629
MINING	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$107,163	$229,628	$160,190	$80,243	$80,157
MINING	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$119,683	$968,546	$905,822	$342,467	$343,000
MINING	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$262,791	$532,519	$360,426	$184,967	$186,189
MINING	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$1,519	$1,456	$1,835	$2,183
MINING	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,271	$32,015	$21,271	$18,752	$21,246	$23,945
MINING	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,694	$33,895	$34,989	$20,475	$21,782	$22,133
MINING	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$194,758	$386,873	$373,430	$377,293	$421,779	$444,569
MINING	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,176	$7,339	$7,254	$7,921	$7,400	$8,272
MINING	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379
MINING	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$305	$100
MINING	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,636	$41,373	$47,884	$57,697	$69,472
MINING	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,797	$5,694	$5,538	$6,409	$7,279
MINING	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379
MINING	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,744	$81,972	$83,292	$81,256	$87,672	$93,311
MINING	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,138	$1,108	$1,281	$1,456
MINING	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	FORT BEND	$0	$43,239	$51,546	$60,279	$66,669	$81,153	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,239	$51,546	$60,279	$66,669	$81,153
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	$0	$195,321	$233,448	$272,640	$301,821	$366,999	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$195,321	$233,448	$272,640	$301,821	$366,999
MISSOURI CITY	SAN JACINTO	HARRIS	$17,679	$20,874	$24,069	$27,477	$31,098	$34,506	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,679	$20,874	$24,069	$27,477	$31,098	$34,506
MISSOURI CITY	BRAZOS	FORT BEND	$0	$5,325	$6,390	$7,455	$8,094	$9,798	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,325	$6,390	$7,455	$8,094	$9,798
MONT BELVIEU	TRINITY	CHAMBERS	$7,474	$9,696	$11,918	$13,534	$15,554	$17,372	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202,151	$1,097,687	$1,200,986	$752,154	$803,170	$876,190
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	$3,434	$4,646	$5,454	$6,464	$7,272	$8,080	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,420	$440,594	$494,086	$325,278	$354,476	$394,827
MONTGOMERY COUNTY MUD #1	SAN JACINTO	MONTGOMERY	$34,832	$44,162	$65,310	$90,190	$123,467	$161,720	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$155,265	$370,810	$699,689	$1,162,955	$1,317,190	$1,216,361

Region H
Table 4C-2: WUG-Level Project Costs

WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Pump Stations: Booster Pump Stations
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	08426200017010	$352,681
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	08426300017010	$675,523
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	08426400017010	$765,049
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	08426500017010	$0
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	08426600017010	$615,702
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	08426700017010	$683,815
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	08426800017010	$0
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	08042400010111	$0
NEEDVILLE	BRAZOS	FORT BEND	08042800007912	$0
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	08042800007913	$0
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	08427200017010	$0
NEW WAVERLY	SAN JACINTO	WALKER	08092600023610	$0
NHCRWA	SAN JACINTO	HARRIS	08800000010110	$28,832,697
NORMANGEE	TRINITY	LEON	08092700014508	$0
NORMANGEE	BRAZOS	LEON	08092700014512	$0
NORMANGEE	TRINITY	MADISON	08092700015708	$0
NORTH BELT UD	SAN JACINTO	HARRIS	08427500010110	$0
NORTH GREEN MUD	SAN JACINTO	HARRIS	08427900010110	$0
NORTHWEST HARRIS COUNTY MUD #23	SAN JACINTO	HARRIS	08428600010110	$0
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	08428700010110	$0
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	08072600017010	$1,135,228
OLD RIVER-WINFREE	TRINITY	CHAMBERS	08072700003608	$0
ONALASKA	TRINITY	POLK	08093300018708	$0
ONALASKA WSC	TRINITY	POLK	08429300018708	$0
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	08429400002013	$0
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	08429400002011	$0
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	08429400007911	$0
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	08073000002011	$86,725
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	08073200017010	$587,557
PARKWAY UD	SAN JACINTO	HARRIS	08429800010110	$194,295
PASADENA	SAN JACINTO	HARRIS	08045600010110	$0
PASADENA	SAN JACINTO-BRAZOS	HARRIS	08045600010111	$0
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	08073400017010	$0
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	$0
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	$0
PECAN GROVE MUD #1	BRAZOS	FORT BEND	08429900007912	$0
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	08429900007911	$0
PINE ISLAND	BRAZOS	WALLER	08093800023712	$0
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	08430200010110	$450,836
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	08046800010110	$773,665
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	08430300007911	$230,458
PLEAK	BRAZOS	FORT BEND	08105300007912	$0
PLUM GROVE	SAN JACINTO	LIBERTY	08105400014610	$0
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	08430500017010	$0
POINT BLANK	TRINITY	SAN JACINTO	08105600020408	$0
PORTER WSC	SAN JACINTO	MONTGOMERY	08430700017010	$0
PRAIRIE VIEW	BRAZOS	WALLER	08048500023712	$0
PRAIRIE VIEW	SAN JACINTO	WALLER	08048500023710	$0
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	08431200017010	$1,707,590
RICHMOND	BRAZOS	FORT BEND	08050000007912	$0
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	08050100002011	$65,903
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	08432200017010	$344,220
RIVERSIDE WSC	TRINITY	SAN JACINTO	08432300020408	$0
RIVERSIDE WSC	TRINITY	WALKER	08432300023608	$0
ROLLING FORK PUD	SAN JACINTO	HARRIS	08441100010110	$553,811
ROMAN FOREST	SAN JACINTO	MONTGOMERY	08080100017010	$0
ROSENBERG	BRAZOS	FORT BEND	08051800007912	$0
SAN FELIPE	BRAZOS	AUSTIN	08095400000812	$0
SAN JACINTO WSC	TRINITY	SAN JACINTO	08432800020408	$0
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	08432900008411	$1,064,686
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	08074300008411	$0
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	08054500010111	$2,556,573
SEALY	BRAZOS	AUSTIN	08054900000812	$0
SHENANDOAH	SAN JACINTO	MONTGOMERY	08074500017010	$2,680,728
SHEPHERD	TRINITY	SAN JACINTO	08074600020408	$0
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	08055800010111	$0
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	08433400007911	$664,728
SIMONTON	BRAZOS	FORT BEND	08106200007912	$0
SOUTH HOUSTON	SAN JACINTO	HARRIS	08056900010110	$0
SOUTHERN MONTGOMERY COUNTY MUD	SAN JACINTO	MONTGOMERY	08433900017010	$1,814,583
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	08057200010110	$86,717
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	08434300002011	$0
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	08434300010110	$780,099
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	08434300014610	$0
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	08434300017010	$0
SPLENDORA	SAN JACINTO	MONTGOMERY	08096200017010	$0
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	08434400017010	$1,226,387
SPRING VALLEY	SAN JACINTO	HARRIS	08057500010110	$687,866
STAFFORD	SAN JACINTO	FORT BEND	08057700007910	$0
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	08057700007911	$0
STAFFORD	SAN JACINTO	HARRIS	08057700010110	$0
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	08434700017010	$644,122
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	08100203603609	$0
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	08100207907912	$0
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	08100208408411	$0
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	08100210110110	$0
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	08100210110111	$0
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	08100217017010	$0
STEAM ELECTRIC POWER	TRINITY	LIBERTY	08100214614608	$0
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	08058500007911	$0
SUGAR LAND	BRAZOS	FORT BEND	08058500007912	$0
SUGAR LAND	SAN JACINTO	FORT BEND	08058500007910	$0
SUNBELT FWSD	SAN JACINTO	HARRIS	08435000010110	$2,368,294
SURFSIDE BEACH	BRAZOS	BRAZORIA	08096700002012	$0
SWEENY	BRAZOS-COLORADO	BRAZORIA	08059000002013	$0
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	08075100010111	$0
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	08060200008411	$7,048,308
THE WOODLANDS	SAN JACINTO	MONTGOMERY	08800100017010	$13,908,058
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	08097300008411	$0
TOMBALL	SAN JACINTO	HARRIS	08060800010110	$0
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	08435500010110	$0
TRINITY	TRINITY	TRINITY	08061000022808	$0
TRINITY BAY CONSERVATION DISTRICT	NECHES-TRINITY	CHAMBERS	08436200003607	$0
TRINITY BAY CONSERVATION DISTRICT	TRINITY	CHAMBERS	08436200003608	$0
TRINITY RURAL WSC	TRINITY	POLK	08436300018708	$0
TRINITY RURAL WSC	TRINITY	TRINITY	08436300022808	$0
TRINITY RURAL WSC	TRINITY	WALKER	08436300023608	$0
VARNER CREEK UD	BRAZOS	BRAZORIA	08437000002012	$0
WALKER COUNTY RURAL WSC	TRINITY	WALKER	08437200023608	$0
WALLER	SAN JACINTO	HARRIS	08062900010110	$175,378
WALLER	SAN JACINTO	WALLER	08062900023710	$0
WALLIS	BRAZOS-COLORADO	AUSTIN	08063000000813	$0
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	08063500010111	$0
WEST COLUMBIA	BRAZOS	BRAZORIA	08064000002012	$0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	08064000002013	$0
WEST HARDIN WSC	NECHES	LIBERTY	08438300014606	$0
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	08438700010110	$0
WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	08064300010110	$877,377
WHCRWA	SAN JACINTO	FORT BEND	08800200007910	$2,914,098
WHCRWA	SAN JACINTO	HARRIS	08800200010110	$31,298,266
WILLIS	SAN JACINTO	MONTGOMERY	08065500017010	$1,175,485
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	08439800010110	$409,525
WINDFERN FOREST UD	SAN JACINTO	HARRIS	08440100010110	$586,501
WOODBRANCH	SAN JACINTO	MONTGOMERY	08080700017010	$0
WOODCREEK MUD	SAN JACINTO	HARRIS	08440400010110	$0
NFBWA	BRAZOS	FORT BEND	NFBWA07912	$3,841,355
NFBWA	SAN JACINTO	FORT BEND	NFBWA07910	$10,059,699
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA07911	$23,188,613
NFBWA	SAN JACINTO	HARRIS	NFBWA10110	$799,728
CHCRWA	SAN JACINTO	HARRIS	CHCRWA10110	$2,045,610
KENDLETON	BRAZOS-COLORADO	FORT BEND	KENDLETON07913	$0
MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY17010	$2,075,154
STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH17010	$0

WUG Name	Pump Stations: Booster Pump Stations	Pump Stations: Raw Water Pump Stations	Connection Costs: Pipeline Connections	Treatment Plants: Surface Water Treatment Plants	Treatment Plants: Groundwater Treatment Plants	Treatment Plants: Direct Reuse Plants	Wells: Municipal Supply Wells	Wells: Agricultural Wells	Other Capital Costs: Land and Easements	Other Capital Costs: Mitigation	Other Capital Costs: Capital Costs for Irrigation Conservation	Other Capital Costs: Engineering, Contingencies, Financial and Legal Services	Other Capital Costs: Interest During Construction	Other Capital Costs: Project-Specific Capital Costs	Total Capital Cost	Debt Service 2010	Debt Service 2020	Debt Service 2030	Debt Service 2040	Debt Service 2050	Debt Service 2060	Operations and Maintenance 2010	Operations and Maintenance 2020	Operations and Maintenance 2030	Operations and Maintenance 2040	Operations and Maintenance 2050	Operations and Maintenance 2060	Energy 2010	Energy 2020	Energy 2030	Energy 2040	Energy 2050	Energy 2060
MONTGOMERY COUNTY MUD #19	$352,681	$0	$120,983	$0	$128,830	$0	$140,635	$0	$48,485	$48,485	$0	$260,095	$89,853	$0	$1,190,048	$16,434	$34,306	$87,320	$69,448	$0	$0	$8,036	$16,775	$26,802	$26,802	$26,802	$26,802	$5,893	$12,302	$10,068	$8,300	$8,864	$9,208
MONTGOMERY COUNTY MUD #8	$675,523	$185,000	$231,418	$3,812,841	$123,365	$0	$134,740	$0	$48,485	$48,485	$0	$1,807,011	$577,151	$6,000,000	$13,644,019	$29,367	$361,995	$403,871	$296,137	$230,234	$8,309	$14,356	$149,391	$179,200	$249,062	$249,949	$250,443	$10,534	$13,301	$26,462	$35,457	$36,341	$36,832
MONTGOMERY COUNTY MUD #9	$765,049	$203,022	$262,022	$4,185,132	$155,777	$0	$170,110	$0	$48,485	$48,485	$0	$2,009,389	$640,903	$6,000,000	$14,488,374	$28,341	$354,371	$427,142	$370,854	$278,639	$14,830	$13,855	$146,070	$189,087	$275,696	$277,175	$278,161	$10,166	$13,735	$30,039	$38,658	$40,131	$41,114
MONTGOMERY COUNTY UD #2	$0	$0	$0	$0	$284,665	$0	$310,745	$0	$0	$0	$0	$208,394	$65,647	$0	$869,450	$19,925	$41,698	$33,278	$19,517	$16,025	$14,587	$9,743	$20,389	$26,015	$29,933	$33,852	$37,067	$7,146	$14,954	$19,079	$21,952	$24,825	$27,182
MONTGOMERY COUNTY UD #3	$615,702	$0	$211,300	$0	$203,649	$0	$222,322	$0	$48,485	$48,485	$0	$438,541	$146,065	$0	$1,934,549	$16,845	$37,797	$37,386	$95,773	$95,926	$35,093	$8,237	$18,482	$26,518	$38,190	$40,947	$44,024	$6,041	$13,554	$19,448	$11,737	$14,487	$17,557
MONTGOMERY COUNTY UD #4	$683,815	$0	$234,104	$0	$348,373	$0	$380,642	$0	$48,485	$48,485	$0	$576,426	$189,501	$0	$2,509,830	$34,290	$72,476	$58,522	$134,624	$121,259	$11,719	$16,761	$35,423	$45,367	$62,855	$64,014	$64,803	$12,302	$26,004	$33,297	$17,680	$18,834	$19,619
MONTGOMERY COUNTY WCID #1	$0	$0	$0	$0	$462,777	$0	$505,277	$0	$0	$0	$0	$338,819	$106,732	$0	$1,413,605	$17,256	$38,823	$38,618	$34,717	$40,671	$49,704	$8,438	$18,984	$27,321	$35,960	$47,208	$60,261	$6,188	$13,923	$20,037	$26,372	$34,623	$44,199
NASSAU BAY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NEEDVILLE	$0	$0	$0	$0	$246,881	$0	$269,481	$0	$0	$0	$0	$180,727	$56,931	$0	$754,020	$0	$8,834	$19,928	$22,393	$27,118	$34,511	$0	$4,320	$9,746	$15,271	$23,007	$32,147	$0	$3,168	$7,146	$11,197	$16,869	$23,573
NEEDVILLE	$0	$0	$0	$0	$298,541	$0	$325,904	$0	$0	$0	$0	$218,556	$68,848	$0	$911,848	$0	$10,889	$24,242	$27,118	$32,663	$41,493	$0	$5,325	$11,855	$18,586	$27,827	$38,874	$0	$3,904	$8,692	$13,628	$20,405	$28,508
NEW CANEY MUD	$0	$0	$0	$0	$2,205,950	$0	$2,449,750	$0	$0	$0	$0	$1,629,495	$513,312	$0	$6,798,508	$54,566	$111,995	$138,916	$173,936	$228,148	$306,794	$26,649	$54,691	$94,418	$139,447	$205,220	$287,697	$19,595	$40,221	$69,540	$102,836	$151,971	$214,291

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	$5,050	$5,050	$5,050	$5,050	$5,050	$5,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,413	$68,433	$129,240	$109,600	$40,716	$41,060
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	$15,550	$20,215	$24,569	$25,813	$25,502	$25,502	$0	$0	$0	$0	$0	$0	$1,004,776	$1,004,776	$481,669	$481,669	$481,669	$481,669	$1,074,584	$1,549,679	$1,115,771	$1,088,137	$1,023,695	$802,754
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	$8,888	$12,120	$15,352	$16,766	$17,170	$17,372	$0	$0	$0	$0	$0	$0	$1,004,776	$1,004,776	$481,669	$481,669	$481,669	$481,669	$1,066,027	$1,531,072	$1,143,288	$1,183,643	$1,094,783	$833,145
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	$6,262	$6,262	$6,060	$6,060	$6,060	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,076	$83,303	$84,432	$77,462	$80,762	$84,896
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	$9,019	$9,330	$10,263	$11,507	$13,373	$15,861	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,142	$79,163	$93,615	$157,208	$164,733	$112,534
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	$18,038	$18,038	$17,727	$17,416	$17,416	$17,416	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$81,391	$151,941	$154,913	$232,575	$221,523	$113,557
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	$9,330	$9,641	$10,574	$12,129	$13,995	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,212	$81,371	$96,550	$109,178	$136,497	$170,647
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NEEDVILLE	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,322	$36,820	$48,861	$66,994	$90,231
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	$0	$5,598	$6,842	$8,086	$9,641	$11,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,716	$51,631	$67,418	$90,536	$120,693
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	$14,697	$32,589	$42,600	$53,676	$69,438	$87,756	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$115,507	$239,496	$345,474	$469,895	$654,777	$896,538
NEW WAVERLY	SAN JACINTO	WALKER	$0	$2,626	$2,626	$2,626	$2,626	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,079	$12,116	$8,108	$6,390	$6,390
NHCRWA	SAN JACINTO	HARRIS	$1,301,082	$1,534,796	$1,712,960	$1,810,122	$1,849,512	$1,896,578	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,301,082	$5,366,971	$9,039,872	$28,030,928	$44,733,069	$34,969,856
NORMANGEE	TRINITY	LEON	$0	$1,212	$1,414	$1,414	$1,414	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,387	$7,488	$5,080	$3,980	$4,053
NORMANGEE	BRAZOS	LEON	$0	$606	$606	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,125	$3,263	$2,367	$1,677	$1,751
NORMANGEE	TRINITY	MADISON	$202	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$961	$1,340	$929	$1,104	$1,104
NORTH BELT UD	SAN JACINTO	HARRIS	$8,397	$11,196	$13,684	$15,861	$18,660	$21,148	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,900	$156,775	$195,823	$189,640	$209,529	$235,673
NORTH GREEN MUD	SAN JACINTO	HARRIS	$6,531	$7,153	$7,464	$8,086	$8,708	$9,330	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,413	$98,977	$104,048	$80,196	$78,013	$84,570
NORTHWEST HARRIS COUNTY MUD #23	SAN JACINTO	HARRIS	$10,885	$13,373	$16,172	$18,660	$21,459	$23,947	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$64,385	$190,321	$232,062	$214,782	$233,192	$262,574
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	$39,192	$46,221	$46,221	$45,369	$44,943	$44,943	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$287,958	$845,670	$841,950	$538,707	$465,612	$465,612
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	$12,751	$13,995	$16,483	$19,904	$23,947	$29,234	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$56,392	$117,200	$243,889	$214,924	$137,314	$196,476
OLD RIVER-WINFREE	TRINITY	CHAMBERS	$3,732	$4,043	$4,354	$4,665	$4,976	$5,287	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,191	$301,096	$283,454	$126,319	$134,280	$145,620
ONALASKA	TRINITY	POLK	$0	$2,626	$2,828	$3,232	$3,434	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,810	$29,779	$29,937	$31,741	$36,359
ONALASKA WSC	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$1,466	$1,145	$4,256
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	$0	$933	$1,244	$1,244	$1,555	$1,555	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,830	$5,799	$7,809	$9,339	$11,111
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	$0	$8,397	$9,641	$10,574	$11,818	$13,062	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,930	$56,707	$68,057	$80,097	$96,896
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	$311	$311	$311	$311	$311	$311	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$311	$5,879	$14,231	$13,190	$10,236	$12,499
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	$1,818	$2,020	$2,424	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,899	$22,981	$16,125	$16,458	$17,692	$20,174
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	$7,272	$7,676	$7,878	$8,282	$8,686	$9,090	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,534	$102,921	$197,017	$167,272	$65,172	$73,329
PARKWAY UD	SAN JACINTO	HARRIS	$3,434	$3,232	$3,232	$3,232	$3,030	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$56,859	$56,559	$14,012	$13,914	$13,589	$13,638
PASADENA	SAN JACINTO	HARRIS	$215,982	$235,578	$253,257	$272,214	$292,662	$315,666	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$215,982	$290,593	$358,360	$347,540	$340,878	$363,882
PASADENA	SAN JACINTO-BRAZOS	HARRIS	$60,492	$65,817	$70,929	$76,254	$82,005	$88,395	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,492	$81,001	$100,158	$97,265	$95,414	$101,804
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	$1,010	$1,010	$1,212	$1,212	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,704	$13,157	$15,972	$18,933	$23,846	$31,563
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	$46,008	$114,594	$134,403	$153,147	$174,021	$195,960	$0	$0	$0	$0	$0	$0	$10,730,935	$10,760,748	$6,856,993	$7,093,688	$7,118,695	$7,142,614	$10,776,943	$10,875,342	$7,150,558	$7,676,420	$7,843,472	$7,887,412
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	$1,704	$3,834	$4,473	$4,899	$5,538	$5,964	$0	$0	$0	$0	$0	$0	$399,160	$369,347	$219,019	$201,683	$176,676	$152,757	$400,864	$378,495	$233,741	$213,955	$186,916	$163,423
PECAN GROVE MUD #1	BRAZOS	FORT BEND	$24,495	$34,506	$34,932	$35,358	$36,423	$37,914	$0	$0	$0	$0	$0	$0	$391,302	$391,302	$197,303	$197,303	$197,303	$197,303	$415,797	$425,808	$232,235	$232,661	$233,726	$235,217
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	$6,603	$9,159	$9,372	$9,372	$9,585	$10,011	$0	$0	$0	$0	$0	$0	$1,470,609	$1,470,609	$743,554	$743,554	$743,554	$743,554	$1,477,212	$1,479,768	$752,926	$752,926	$753,139	$753,565
PINE ISLAND	BRAZOS	WALLER	$0	$1,616	$2,020	$2,424	$2,828	$3,434	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,624	$24,796	$31,768	$42,505	$55,689
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	$17,416	$18,660	$19,904	$21,148	$22,392	$23,947	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$68,881	$85,512	$59,492	$63,524	$68,315	$75,138
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	$23,636	$24,258	$25,191	$26,124	$26,746	$27,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$168,668	$179,045	$78,737	$82,266	$84,193	$88,737
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	$10,574	$10,263	$9,952	$9,952	$9,952	$9,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,574	$54,040	$106,092	$84,307	$58,044	$47,752
PLEAK	BRAZOS	FORT BEND	$0	$7,272	$8,686	$10,100	$11,918	$14,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,185	$76,999	$110,249	$148,357	$195,377
PLUM GROVE	SAN JACINTO	LIBERTY	$0	$2,020	$2,222	$2,626	$3,030	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,306	$27,275	$33,015	$41,095	$50,864
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	$13,684	$16,794	$24,258	$32,655	$44,162	$57,224	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,738	$142,348	$249,301	$378,492	$540,829	$719,046
POINT BLANK	TRINITY	SAN JACINTO	$0	$1,010	$1,212	$1,212	$1,212	$1,212	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,185	$8,425	$7,682	$7,177	$6,736
PORTER WSC	SAN JACINTO	MONTGOMERY	$26,199	$29,181	$36,423	$45,156	$44,730	$44,730	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$148,517	$323,023	$446,419	$575,570	$560,216	$517,570
PRAIRIE VIEW	BRAZOS	WALLER	$0	$2,488	$2,799	$2,799	$3,110	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,611	$70,356	$95,634	$129,346	$170,590
PRAIRIE VIEW	SAN JACINTO	WALLER	$0	$22,392	$24,258	$26,435	$28,923	$32,033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,808	$31,850	$36,732	$42,655	$50,512
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	$31,098	$30,885	$30,672	$30,672	$30,672	$30,672	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$176,372	$343,189	$602,522	$503,751	$206,447	$208,264
RICHMOND	BRAZOS	FORT BEND	$0	$38,127	$45,369	$52,185	$64,113	$77,319	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,127	$45,369	$52,185	$64,113	$77,319
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	$6,220	$6,531	$6,842	$6,842	$7,153	$7,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,473	$28,404	$16,205	$14,690	$17,120	$20,667
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	$15,550	$15,239	$14,928	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$164,476	$267,381	$219,991	$219,982	$258,581	$263,021
RIVERSIDE WSC	TRINITY	SAN JACINTO	$0	$3,421	$4,043	$4,976	$5,598	$6,220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,429	$27,958	$44,569	$50,352	$52,549
RIVERSIDE WSC	TRINITY	WALKER	$0	$0	$1,555	$7,153	$7,464	$8,086	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,452	$25,753	$33,767	$39,394
ROLLING FORK PUD	SAN JACINTO	HARRIS	$7,878	$8,080	$8,484	$8,686	$9,090	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,104	$109,677	$93,118	$55,253	$46,472	$48,698
ROMAN FOREST	SAN JACINTO	MONTGOMERY	$9,952	$15,550	$22,081	$28,923	$38,564	$49,760	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,248	$156,189	$269,324	$353,515	$474,486	$627,335
ROSENBERG	BRAZOS	FORT BEND	$31,950	$105,861	$131,208	$157,194	$192,552	$234,513	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,950	$105,861	$131,208	$157,194	$192,552	$234,513
SAN FELIPE	BRAZOS	AUSTIN	$0	$1,616	$1,818	$1,818	$1,818	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,588	$15,104	$13,827	$12,089	$12,925
SAN JACINTO WSC	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,810	$46,308	$44,864	$39,844	$36,860
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$253,564	$253,942	$62,258	$62,053	$62,053
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	$32,589	$38,766	$44,304	$50,481	$56,232	$62,409	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$256,168	$346,581	$263,431	$291,936	$313,286	$339,366
SEALY	BRAZOS	AUSTIN	$0	$30,167	$34,832	$37,009	$38,253	$40,119	$0	$0	$0	$0	$0	$0	$0	$783,504	$783,504	$221,164	$221,164	$238,451	$0	$813,671	$818,336	$258,173	$259,417	$278,570
SHENANDOAH	SAN JACINTO	MONTGOMERY	$32,344	$37,631	$43,851	$50,382	$59,401	$70,286	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$144,858	$316,426	$622,644	$537,244	$324,465	$452,751
SHEPHERD	TRINITY	SAN JACINTO	$0	$4,040	$4,444	$4,646	$4,848	$4,848	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24,537	$39,745	$35,306	$32,431	$31,595
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,138	$727	$522	$522
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	$19,593	$22,392	$22,392	$22,392	$22,392	$22,392	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,593	$94,008	$176,740	$127,046	$64,995	$60,247
SIMONTON	BRAZOS	FORT BEND	$0	$0	$0	$7,676	$9,090	$10,908	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,605	$65,660	$79,707	$107,144	$150,720
SOUTH HOUSTON	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,972	$17,840	$13,526	$8,184	$8,184
SOUTHERN MONTGOMERY COUNTY MUD	SAN JACINTO	MONTGOMERY	$25,773	$32,376	$32,589	$33,654	$34,080	$34,932	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$145,075	$359,380	$654,741	$535,866	$221,729	$225,798
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	$1,212	$4,848	$5,050	$5,454	$5,656	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,212	$16,864	$22,537	$16,466	$18,213	$20,885
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	$0	$622	$1,244	$1,555	$1,555	$1,555	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$622	$1,244	$1,934	$2,693	$4,007
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	$8,946	$10,011	$11,289	$12,141	$13,419	$14,484	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,779	$119,218	$114,454	$81,893	$76,667	$83,588
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	$0	$311	$311	$311	$311	$622	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,070	$1,830	$2,178	$2,905	$3,945
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	$4,665	$5,287	$6,531	$8,086	$9,952	$12,440	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,987	$44,004	$60,706	$77,089	$103,379	$137,197
SPLENDORA	SAN JACINTO	MONTGOMERY	$2,020	$2,424	$3,232	$4,242	$5,656	$7,272	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,547	$33,929	$49,973	$69,936	$101,937	$137,065
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	$9,952	$11,196	$14,928	$18,971	$24,880	$31,411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$44,490	$96,200	$215,538	$202,339	$152,498	$219,790
SPRING VALLEY	SAN JACINTO	HARRIS	$16,483	$17,105	$17,416	$18,038	$18,660	$19,593	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,556	$141,180	$123,367	$75,747	$64,822	$68,366
STAFFORD	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	$13,684	$16,794	$16,794	$16,483	$16,483	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$61,497	$141,594	$151,389	$219,439	$209,215	$106,839
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$961,955	$2,610,816	$2,933,615	$2,836,673	$3,624,471	$4,496,654
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,970,587	$11,147,281	$15,685,594	$18,051,177	$17,739,996
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$554,054	$1,732,692	$1,653,555	$2,630,178	$2,671,173	$1,475,665
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$384,291	$367,642	$153,318	$598,132	$1,506,780
STEAM ELECTRIC POWER	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$468,794	$737,753	$809,646	$1,058,208	$1,357,694
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	$0	$181,902	$186,588	$185,736	$185,736	$185,736	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$181,902	$186,588	$185,736	$185,736	$185,736
SUGAR LAND	BRAZOS	FORT BEND	$0	$133,125	$136,533	$135,894	$135,894	$135,894	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$133,125	$136,533	$135,894	$135,894	$135,894
SUGAR LAND	SAN JACINTO	FORT BEND	$0	$13,419	$13,632	$13,632	$13,632	$13,632	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,419	$13,632	$13,632	$13,632	$13,632
SUNBELT FWSD	SAN JACINTO	HARRIS	$60,705	$70,503	$79,875	$89,886	$99,684	$110,121	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$182,419	$620,317	$1,345,836	$1,593,029	$1,503,468	$1,551,576
SURFSIDE BEACH	BRAZOS	BRAZORIA	$0	$2,020	$2,424	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,195	$13,432	$18,207	$21,924	$26,779
SWEENY	BRAZOS-COLORADO	BRAZORIA	$0	$9,330	$12,440	$12,751	$13,373	$13,995	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,330	$18,893	$26,797	$35,693	$46,630
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,637,215	$1,637,215	$446,195	$446,195	$446,195
THE WOODLANDS	SAN JACINTO	MONTGOMERY	$198,090	$359,118	$382,548	$380,844	$378,927	$378,927	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,047,973	$3,958,418	$3,919,988	$1,800,701	$1,532,735	$1,555,399
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$867,835	$868,594	$275,924	$275,513	$275,513
TOMBALL	SAN JACINTO	HARRIS	$35,358	$44,517	$51,972	$65,178	$75,189	$89,460	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$268,632	$816,598	$970,732	$1,037,897	$1,155,834	$1,354,101
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	$19,170	$18,531	$18,318	$18,105	$18,105	$18,105	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$145,632	$349,349	$329,631	$217,381	$190,887	$190,887
TRINITY	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$612	$201	$201	$201
TRINITY BAY CONSERVATION DISTRICT	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY BAY CONSERVATION DISTRICT	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VARNER CREEK UD	BRAZOS	BRAZORIA	$0	$4,848	$5,454	$6,262	$7,070	$7,878	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,929	$46,449	$60,026	$71,425	$86,128
WALKER COUNTY RURAL WSC	TRINITY	WALKER	$0	$16,794	$17,105	$16,483	$16,483	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,399	$62,273	$45,627	$41,759	$47,453
WALLER	SAN JACINTO	HARRIS	$1,414	$1,818	$2,222	$2,424	$2,828	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,414	$28,387	$44,733	$43,461	$47,763	$77,850
WALLER	SAN JACINTO	WALLER	$0	$5,454	$6,464	$7,474	$8,686	$10,302	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,782	$65,674	$88,327	$115,544	$148,666
WALLIS	BRAZOS-COLORADO	AUSTIN	$0	$2,222	$2,222	$2,222	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,296	$11,333	$9,943	$9,261	$10,131
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,810	$51,241	$37,271	$23,507	$23,507
WEST COLUMBIA	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST HARDIN WSC	NECHES	LIBERTY	$0	$404	$404	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,682	$5,339	$6,206	$7,425	$9,814
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	$10,574	$10,263	$10,263	$10,263	$9,952	$9,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$61,800	$146,799	$140,330	$93,417	$81,233	$81,233
WEST UNIVERSITY PL	SAN JACINTO	HARRIS	$41,961	$44,304	$46,434	$48,564	$51,120	$53,889	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,561	$137,431	$128,842	$134,203	$147,061	$166,381
WHCRWA	SAN JACINTO	FORT BEND	$35,956	$42,218	$48,682	$56,964	$65,246	$73,326	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,956	$85,549	$362,047	$476,685	$446,316	$515,475
WHCRWA	SAN JACINTO	HARRIS	$0	$759,520	$828,604	$878,296	$892,840	$899,304	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$199,396	$3,762,370	$5,680,874	$5,104,153	$4,399,425	$4,154,583
WILLIS	SAN JACINTO	MONTGOMERY	$10,574	$12,129	$15,239	$18,971	$23,947	$30,167	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$47,008	$101,683	$221,369	$203,461	$144,477	$208,218
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	$12,440	$12,129	$11,818	$11,507	$11,507	$11,507	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,916	$103,350	$81,634	$43,145	$34,423	$34,423
WINDFERN FOREST UD	SAN JACINTO	HARRIS	$14,928	$19,282	$18,660	$18,660	$18,660	$18,660	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$48,917	$144,353	$133,698	$65,368	$51,861	$51,861
WOODBRANCH	SAN JACINTO	MONTGOMERY	$2,020	$2,222	$2,424	$2,828	$3,232	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,167	$30,311	$36,466	$40,009	$48,437	$60,692
WOODCREEK MUD	SAN JACINTO	HARRIS	$11,507	$15,239	$18,660	$22,081	$25,502	$28,923	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$68,418	$212,537	$267,817	$261,250	$287,828	$323,422
NFBWA	BRAZOS	FORT BEND	$0	$23,230	$34,138	$47,066	$66,862	$91,708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,141	$264,175	$445,550	$641,774	$914,123
NFBWA	SAN JACINTO	FORT BEND	$0	$0	$340,572	$380,164	$390,668	$388,244	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,615,085	$2,394,807	$1,941,838	$1,607,246
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	$0	$307,242	$433,492	$548,026	$651,046	$748,410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,226,195	$3,885,137	$4,617,610	$5,234,995	$5,872,264
NFBWA	SAN JACINTO	HARRIS	$0	$11,514	$12,322	$13,130	$13,938	$14,948	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$89,691	$135,401	$102,152	$82,535	$70,896
CHCRWA	SAN JACINTO	HARRIS	$0	$72,114	$72,114	$72,114	$72,114	$72,114	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$419,185	$544,685	$286,493	$192,427	$189,904
KENDLETON	BRAZOS-COLORADO	FORT BEND	$0	$2,222	$2,828	$3,636	$4,646	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,544	$40,787	$60,467	$85,443	$117,777
MONTGOMERY	SAN JACINTO	MONTGOMERY	$2,828	$11,514	$16,766	$22,018	$27,472	$32,724	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,150	$300,456	$468,022	$494,548	$670,792	$680,927
STAGECOACH	SAN JACINTO	MONTGOMERY	$808	$1,212	$1,616	$2,222	$3,030	$4,040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,122	$16,017	$27,210	$40,519	$59,362	$87,150

Appendix 4D

Galveston Bay Inflows Study

This Page Intentionally
Left Blank

Section 1- Introduction

Environmental flow study efforts in the 1st biennium of the 2011 Regional Water Planning cycle for Region H focused on future 2060 conditions and the impacts of future management strategies on inflows to Galveston Bay. The *Environmental Flows Study* completed during the 1st biennium revealed substantial impacts to volume, timing, and location of bay and estuary inflows caused by water management strategy (WMS) implementation. Model results indicated that implementation of individual WMS would not have a substantial impact on net bay and estuary (B&E) inflow; however, the combined effect of multiple WMS resulted in some impacts to B&E flows in terms of volume.

The results of the *Environmental Flows Study* and further investigation indicate that the management strategies recommended in the 2006 RWP interact in a complex manner that may result in widely varied impacts on bay and estuary inflow throughout the planning horizon. This is especially the case as the timing of certain strategies such as reuse and the importation of water occur in different decades. Additionally, the application of reuse strategies by Region C in the upper Trinity River Basin is expected to significantly reduce inflows into the Region H portion of the basin. The Region C return flow volume will vary over the 2010 through 2060 planning window. The end result may be a worst-case scenario for inflows to Galveston occurring in a decade sooner than 2060. Identifying impacts of management strategies throughout the planning horizon will better prepare the RHWPG for selecting environmentally conscious solutions to water supply issues.

To address these concerns, six decadal simulations using water availability models (WAMs) were created to represent implementation and size of water management strategies as well as changes in demand for major supply rights and effects of sedimentation on reservoirs. Changes in the impacts of Region H WMS and other factors were then examined. Metrics of particular interest were median annual and monthly B&E inflows as well as flows viewed on an annual basis. As with the *Environmental Flows Study*, monthly inflows were compared to the State's B&E flow targets to determine if these targets were met at the frequencies recommended by the Galveston Bay Freshwater Inflows Group (GBFIG). The modeling methodology is included in *Section 2* of this memorandum, with a summary and discussion of results in *Section 3*.

Section 2- Model Development

In order to determine the effects of WMS implementation over time on B&E inflow, WAM models were developed for each basin to represent conditions for years 2010 through 2060. Strategies were modeled in a manner similar to that used in the *Environmental Flows Study*, However, there are some notable differences for the current round of models. Rather than focusing on Year 2060 six decadal models (2010-2060) were developed for each basin. Additionally, unlike the prior study, water management strategies are not modeled individually but rather are modeled as occurring simultaneously, similar to the old E model. Running decadal models rather than just 2060 also allows strategies to be implemented as they occur; for example, a strategy starting in the 2040s in the San Jacinto basin would not show up in the 2010, 2020, or 2030 model.

Another substantial change is the use of a TCEQ Run 8 WAM for the base model rather than the modified Run 3 as incorporated in the *Environmental Flows Study*. While the full diversion assumption of the Run 3 was deemed appropriate to represent 2060 conditions when existing water rights were assumed to be fully utilized, this same assumption is not appropriate for the decadal analysis conducted herein.

Models were based on TCEQ's Run 8 WAMs for the Neches Trinity, Trinity San-Jacinto, and San Jacinto Basins. Run 8 represents an approximation of current conditions. For the Trinity River Basin, decadal models were based on decadal models provided by TCEQ which were Run 8-based and included upstream Region C WMS. The Brazos and San Jacinto Brazos Basin models were built from a modified Run 8 that included Brazos River Authority system operations.

The general procedure for building the models incorporated:

1. Supply right demands
2. Implementation of strategy coding
3. Area-capacity curve codification

More specific information is provided below.

2.1 Supply Right Demands

Demands for major supply rights in Region H vary considerably over the period from 2010 to 2060. No adjustments to account for this were necessary for the 1st biennium *Environmental Flow Study* models, since those models represented expected 2060 conditions with full authorized diversions.

In DB07, supplies and WMS are allocated to WUGs in order to meet demands. However, in some decades, supplies in excess of actual demand are allocated. This is because many WUGs hold contracts well in excess of their current needs for various reasons. Therefore, care was taken to determine the amount of water used in each decade based on demands at the WUG level, rather than allocations.

DB07 further associates these sources with one or more supply rights. This procedure was applied to the data in DB07 to generate total decadal demand for supplies and associated rights. The decadal demand for each supply right was then applied to water right diversions in the models.

2.2 Strategy Coding

The 2006 Region H Regional Water Plan examined 32 potential WMS. Strategies were evaluated based on a number of parameters, including yield, cost, location, water quality, various environmental impacts, and several other factors. Of these, 23 were recommended by the RWP as recommended WMS, of which 17 were considered as potential candidates for modeling in the 2011 Planning cycle.

The 1st biennium Environmental Flows Study deemed 12 of the 17 suitable to be modeled. For the 2nd biennium Environmental Flows Investigation, the same 12 strategies are modeled. All 17 major WMS are described below as well as specifics on code development for those strategies that were modeled. Note that this phase of modeling was carried out prior to final WMS selection for the 2011 RWP. Thus, some of these strategies have not been selected for the 2011 RWP, while strategy definitions or total allocated volumes may have changed for other strategies. All strategies modeled reflect volumes, definitions, and recommendation status for the 2006 RWP.

1. Municipal Conservation: This WMS relies on demand reduction to allow existing supplies to meet demands for longer periods of time. This can also potentially delay the need to develop new municipal supplies. This WMS was not modeled as the conservation strategies do not involve the creation of new water supplies or their return flows.

2. Irrigation Conservation: The Irrigation Conservation strategy is similar in intent to the municipal conservation WMS. Potential conservation methods include irrigation scheduling, leveling and contour farming, ditch lining, and drip line installation, as well as other methods. This WMS was not modeled as any water conserved does not represent any additional water supply creation or return.

3. Freeport Desalination: The Freeport Desalination WMS involves the construction of a desalination facility in Freeport, Texas on the site of the Dow chemical plant. Water desalinated by the plant would be piped upstream for municipal use in demand centers in Fort Bend and Brazoria Counties. Freeport Desalination was modeled in the Brazos/San Jacinto-Brazos WAM and was active for all six decadal periods. The effects of added desalination supply were approximated by new return flows at points of use associated with the strategy. The added return flows were modeled with CI cards. This WMS is listed as an alternative for the 2011 RWP.

4. Expanded Use of Groundwater: This WMS relies on sustainable expansion of existing groundwater supplies, with limits on increases to correspond with groundwater reduction plans and conservation district rules. Increases are within the limits of sustainable yield and subject to groundwater conservation district and subsidence district rules. The WMS associated with expanded use of groundwater supplies was modeled in all of the study basins. Because additional groundwater will be utilized near the point of production before entering the stream network, effects of expanded groundwater use were approximated as new return flows. Return flows were modeled with CI cards for each point-of-use WUG.

5. Expand/Increase Current Contracts: This WMS includes allocation of currently permitted water supplies for use by current contract participants. This includes the extension of current contracts with terms ending before the year 2060, as well as the increase of current contracts to meet future demands. This growth in contracts was incorporated as part of the supply diversion adjustment above.

6. New Contracts from Existing Supply: New contracts would be created from existing supply sources. Again, this increase in allocation was handled as part of the supply diversion adjustment above.

7. BRA System Operations Permit: The Brazos River Authority (BRA) System Operations WMS aims to increase the yield of BRA reservoirs by coordinating operation of reservoirs as a system and the permitting of a portion of the return flows in the Brazos River basin. This would allow for additional yield without the need for construction of new infrastructure. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes to simulate system operations were necessary. CI cards were added to reflect return flows at the WUG level from this diversion. CI cards were also added to the San Jacinto and Trinity models to represent an interbasin transfer (IBT) from the Brazos Basin. This WMS was active for all decades. No modifications were necessary in the Brazos portion of the WAM as the Brazos River Basin does not contribute directly to B&E inflows to Galveston Bay.

8. Allens Creek Reservoir: The Allens Creek Reservoir WMS is a proposed off-channel reservoir in Austin County. The reservoir would hold peak flows diverted from the Brazos River, with diversions to the reservoir indexed to streamflow. Water from the reservoir would be used to supply municipal, industrial, and irrigation needs in several counties. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes to represent the reservoir were necessary. CI cards were used to represent return flows at the WUG level as well as the IBT of water to the San Jacinto-Brazos Basin. The Allens Creek WMS is expected to be active for the 2030 model onward.

9. Little-River Off-Channel Reservoir: This WMS would be an off-channel reservoir in Milam County intended to divert and store excess flows for producing firm capacity. The WMS was originally assessed by the Brazos G region but has been investigated by Region H. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes were necessary. CI cards representing return flows from point-of-use WUGs were only inserted for the 2050 and 2060 models. This WMS is listed as an alternative for the 2011 RWP.

10. Non-Municipal Contractual Transfers: The Non-Municipal Contractual Transfer WMS involves transferring surplus water supply to neighboring counties and basins with projected shortages. These transfers would make use of existing conveyances where possible. This strategy was not modeled as the WRAP program allocates water for water right diversions, not contracts. This WMS is not recommended in the 2011 RWP.

11. Wastewater Reuse for Industry: Water for this WMS would come from treated effluent from three City of Houston (COH) Waste Water Treatment Plants (WWTPs). After treatment, water would be piped to industrial users along the south side of the Houston Ship Channel corridor. Wastewater reuse for industry was modeled through the alteration and addition of CI cards in the San Jacinto Basin WAM. Two CI cards representing the three source WWTPs were reduced by the WMS amount. The specific reduction for each plant was assumed proportional to total plant output. Return flows from the strategy were assumed to occur along the Houston Ship Channel. New CI cards, representing return flows from industrial users, were added to the model after existing CI cards. This WMS was active for 2020 through 2060.

12. TRA to Houston Contract: This is a surface water agreement between the COH and TRA to allow COH to acquire a portion of uncommitted TRA water supplies from the Lake Livingston-Wallisville Saltwater Barrier system. The Trinity Basin is the source of WMS water for this scenario. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. For the receiving basins, changes were made to the San Jacinto and Brazos/San Jacinto-Brazos models. CI cards were added in the San Jacinto and Brazos/San Jacinto-Brazos models to reflect return flows from points of use. This WMS was incorporated into the 2020 through 2060 models.

13. TRA to SJRA Contract: This strategy proposes the transfer of some SJRA supply in the Trinity River and some TRA supply in Lake Livingston to Montgomery County via Lake Houston. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. CI cards were added in the San Jacinto WAM for the southern part of Montgomery County near Conroe, Texas to reflect return flows from points of use. This WMS was active for the 2030 through 2060 models. The updated strategy definition for the 2011 RWP indicates that water for this transfer will not be conveyed via Luce Bayou, but will rely on another conveyance.

14. Houston to Gulf Coast Water Authority (GCWA) Transfer: The Houston to GCWA WMS involves the transfer of water from the Coastal Water Authority (CWA) system to GCWA's Texas City Reservoir by way of the CWA Bayport facility. Shortages would be met in Galveston County and possibly Fort Bend County. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. CI cards were added in the Brazos, San Jacinto-Brazos, and San Jacinto WAMs to reflect return flows from this WMS. This WMS was active for the 2050 and 2060 models. This WMS is not recommended in the 2011 RWP.

15. Houston Indirect Wastewater Reuse: Water for this WMS would be reclaimed from effluent from City of Houston WWTPs in seven small basins. Water would receive additional treatment and be transferred by bed and banks permits to diversion locations for municipal and industrial users. This scenario involves reclaiming effluent from WWTPs in seven sub-basins in the San Jacinto WAM for municipal and industrial uses. Diversions associated with the strategy were represented by eight WR cards (including an IBT to the San Jacinto-Brazos Basin from Sims Bayou) with annual diversion targets proportional to the WWTP flow in each sub-basin. For the Brazos/San Jacinto-Brazos model, the IBT to the San Jacinto-Brazos Basin was modeled using two CI cards representing the Harris Manufacturing and Harris Steam Electric WUGs. This WMS was active for the 2050 and 2060 models.

16. NHCRWA Indirect Wastewater Reuse: The NHCRWA Indirect Reuse strategy includes reclamation of water from up to 163 WWTPs in the NHCRWA service area discharging to tributaries of the San Jacinto River and Lake Houston. Water would be transferred via bed and banks permits to diversion locations to serve industrial reuse and municipal and commercial irrigation reuse. The WMS was modeled in the San Jacinto WAM with three new water right diversion WR cards. This WMS was active for the 2050 and 2060 models.

17. Lake Houston Additional Yield: Based on WRAP modeling for the last RWP, additional unappropriated volume was identified in Lake Houston. This strategy reflects the permitting of this storage. For the scenario utilizing additional unappropriated flow from Lake Houston, the WMS was represented as a new water right. A WR card with an annual diversion total of 32,500 acre-feet from Lake Houston was added to the San Jacinto WAM. A WS card at Lake Houston associated with the right was added, with the storage volume for the right located at the top of the conservation pool. This WMS was active for all decades. This is not considered as a WMS in the 2011 RWP, as the permit has been granted. Volumes associated with the permit are shown as a non-WMS supply right.

2.3 Area-Capacity Curve Modification

The spatial characteristics of the modeled reservoirs (area, volume, depth) are expected to change over time, due primarily to the effects of sedimentation. Depending on reservoir properties and sedimentation rates, under Year 2060 conditions a reservoir may have far less storage than it did in 2010. For this reason, reservoir area-capacity data was adjusted by decade when possible to more accurately reflect expected conditions.

These changes are not implemented in all of the WAM basins. The Neches-Trinity has only one small reservoir and the Trinity-San Jacinto WAM has no reservoirs represented with SV/SA cards. Reservoir parameters were not adjusted in the Brazos/San-Jacinto Brazos due to a lack of sedimentation data. Data was available to generate for the majority of reservoirs in the Trinity River Basin. However, since the area-capacity data had already been modified for a number of reservoirs in the base model itself (in comparison to Run 8), no additional changes were made to SV/SA cards.

For the San Jacinto models, however, SV/SA cards were updated using a baseline reservoir configuration and a sedimentation rate obtained from a sedimentation survey. Beginning with the baseline reservoir configuration for Year 2000, the sedimentation rate and elapsed time since survey data collection were used in an iterative application of the trapezoid method to yield a new set of shape parameters for each decade. These parameter sets were then reduced to twelve data points each to serve as SV/SA cards for the models.

Section 3- Model Results

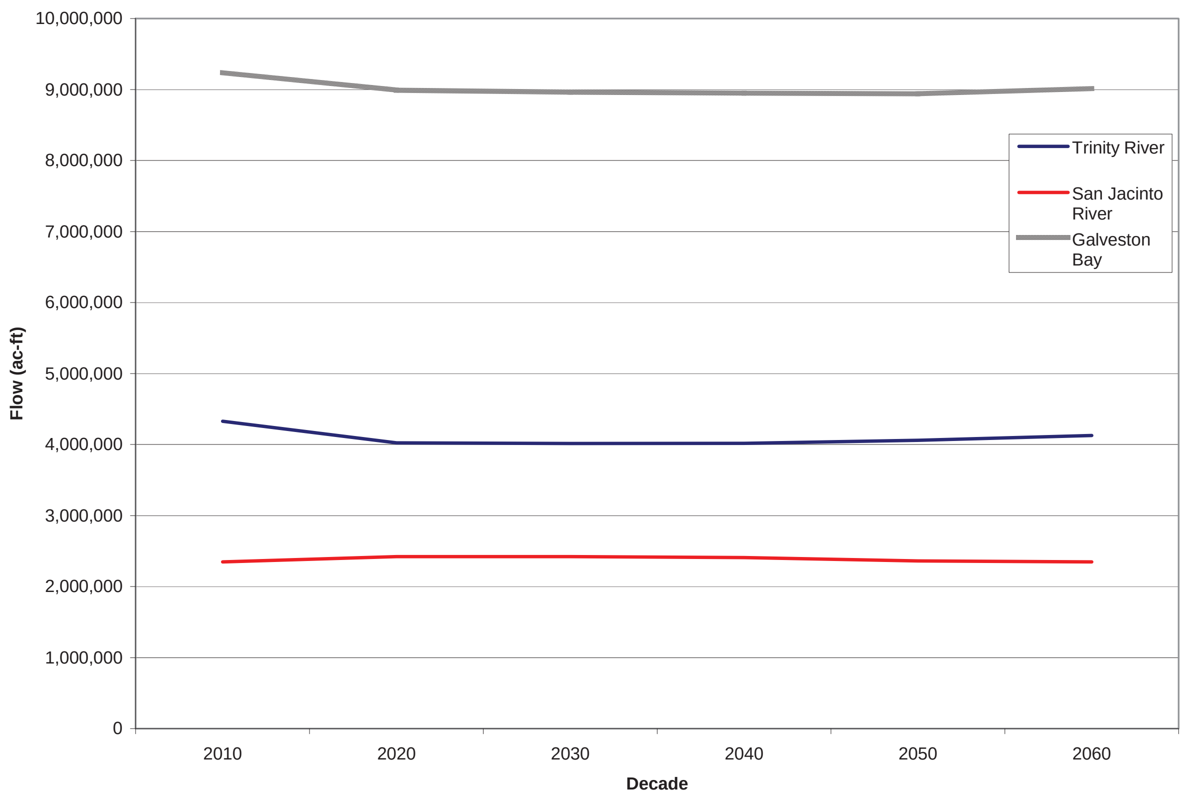
As indicated earlier, decadal WAM models were executed for six basins (the San Jacinto, Trinity, and Brazos Basins and the San Jacinto-Brazos, Neches-Trinity, and Trinity-San Jacinto Coastal Basins). Results were then extracted from the WAM output file using the TABLES program included as part of the WRAP modeling package. For each month of the 57-year simulation period, modeled flow volumes were extracted for the eight model control points contributing to B&E inflows. B&E flows were primarily driven by the Trinity and San Jacinto Rivers, which for the six decadal models contributed approximately 78 percent of B&E inflows. The remaining 22 percent of inflow was contributed by the three coastal basins. Annual and monthly median B&E inflows were determined for each model and compared to reveal trends in B&E flow with time as WMS are implemented. Flows were also examined to determine frequency of attaining B&E flow targets as established by TWDB and TPWD. The relevant river and coastal basins are shown along with the Galveston Bay System in *Figure 1*.

Figure 1
Galveston Bay System

3.1 Annual B&E Inflows

Annual median B&E inflows are given for the total Galveston Bay System as well as the Trinity and San Jacinto Rivers in *Figure 2* below.

Figure 2
Median Annual B&E Flow by Decade for Galveston Bay



Median annual inflows from the San Jacinto River vary across the six decades, with a difference of approximately 75,000 acre-feet per year between the highest and lowest median annual flow. After 2010, median flows increased by approximately 60,000 to 75,000 acre-feet per year for the period from 2020 through 2040, after which flows declined to levels near those in 2010. For the Year 2010 model, only a few WMS have been implemented, adding only a small volume of water to the San Jacinto River Basin in the form of return flows from points of use. Although demand for water from major supply rights increases with time, additional WMS return flows over the period of 2020 through 2040 result in increased annual median B&E discharge. The sudden decline in median flows after 2040 is due to implementation of two reuse-type WMS beginning in the Year 2050 model. The City of Houston Indirect Reuse and NHCRWA Indirect Reuse strategies are intended to divert approximately 75,000 to 90,000 acre-feet per year of wastewater effluent from the San Jacinto River Basin for municipal and industrial users. Additionally, reservoir volumes in the basin gradually decrease over the planning window due to the effects of sedimentation.

The Trinity River is the largest single contributor to median annual inflow volume in the Galveston Bay System. As shown in *Figure 2*, median annual inflow from the Trinity River drops sharply between the 2010 and 2020 models, reaching its lowest level in 2030. Median annual flows for Trinity Bay are, by this point, reduced by more than 300,000 acre-feet per year. From 2030 through 2060, median annual flows gradually increase by over 100,000 acre-feet per year, but do not return to 2010 levels during the planning period.

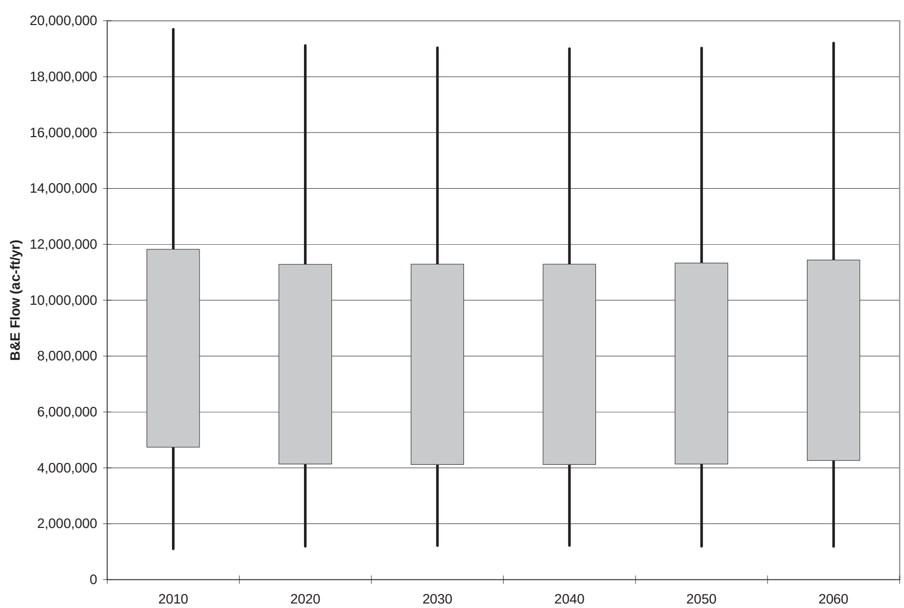
The pattern of B&E flows for the Trinity River is due to the combined effects of Region H WMS implementation and the upstream implementation of conservation strategies by Region C. The Region C Water Planning Group investigated the impacts of proposed reuse on return flows to Region H (for the Trinity River near Oakwood) in the *Region C Water Conservation and Reuse Study*. The Region C report demonstrated a sharp decline in flows to Region H beginning after 2010 due to the implementation of reuse; this decline continued through 2030 (reduction of 162,000 acre-feet per year) after which return flows increased through the end of the planning window, eventually exceeding 2010 levels. This increase subsequent to 2030 is due to increased demand in the Region C portion of the basin, resulting in return flows that increasingly exceed reuse volumes. General similarities between the patterns of Region C return flow and Trinity Bay inflow indicate that upstream reuse will have a substantial impact on Galveston Bay inflow.

However, Region H WMS also appear to play a role in determining Trinity Bay flows. The reduction in Trinity Bay inflow subsequent to 2010 is greater than the reduction in return flows from Region C. Additionally, while Region C return flows are higher in 2060 than in 2010, Trinity Bay inflows do not fully return to 2010 levels by the end of the planning period. The likely cause of this is increasing demand on interbasin transfers the Trinity River to the San Jacinto River Basin, including the TRA to Houston and TRA to SJRA management strategies. Demand for these two strategies alone increases by 200,000 acre-feet across the planning window.

The pattern of median annual B&E inflow for the complete Galveston Bay System reflects the patterns of the component bays, particularly the pattern of inflow for the Trinity River attenuated by the nearly-opposite but lower-magnitude pattern of the San Jacinto River. As shown in *Figure 2,* the median B&E inflow falls considerably after 2010, reflecting the impact of reduced upstream return flows and implementation of Region H WMS. For subsequent decadal models the median inflows vary little, suggesting that while flows in the Trinity and San Jacinto Rivers may change over time, the additional net effect of Region H WMS on total B&E flow after 2010 will be minor; changes appear to involve relocation of inflow to a greater extent than an alteration in total volume.

This is not, however, an indication that B&E inflows will not vary from year to year. It is important to remember that each decadal model includes a 57-year simulation period under a certain set of conditions; the median values reported in the preceding sections represent a statistical summary of this simulation period. For example, for the Year 2060 model total annual flow varied from 1.2 to 19.2 million acre-feet per year. The range of annual B&E flows for the six decadal simulations are shown in *Figure 3*.

Figure 3
Inter-Annual Variability in B&E Flows



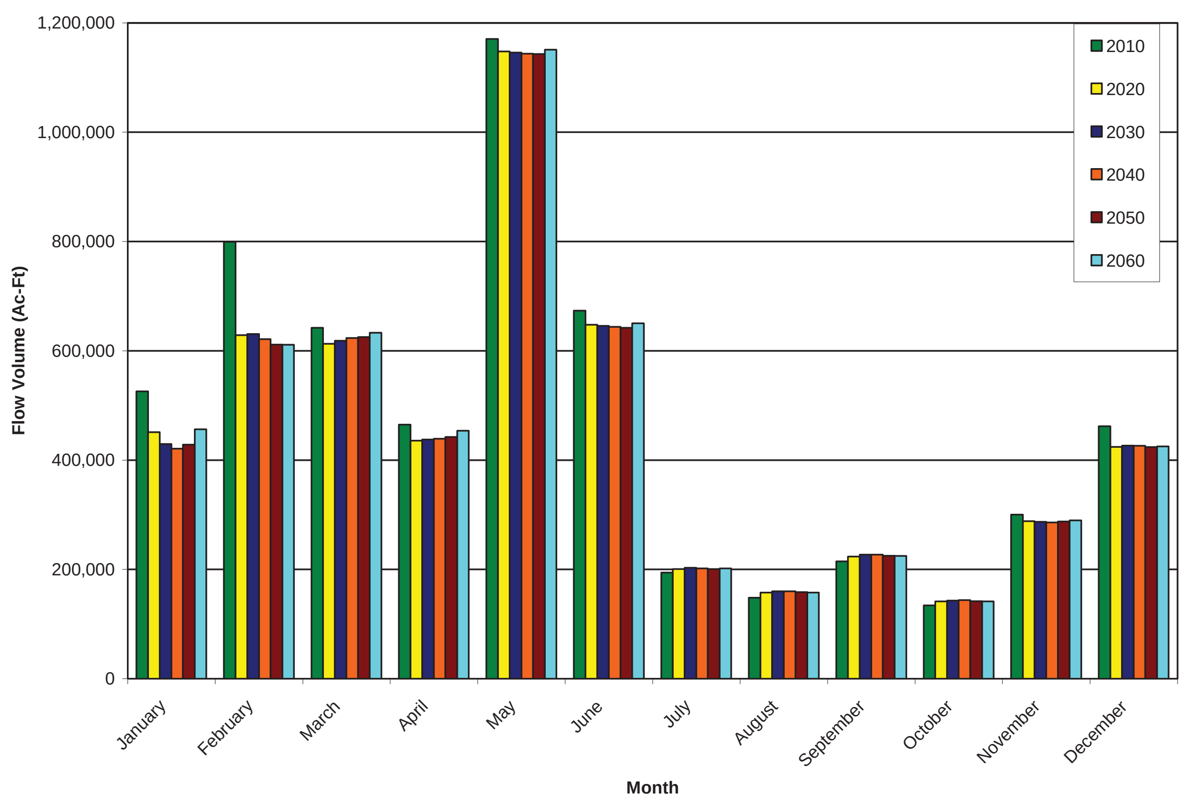
3.2 Monthly Medians

Median B&E flows were also calculated on a monthly basis for the six sets of decadal models. The results of the monthly analysis show similar patterns to those revealed in the analysis of median annual B&E flows.

For the San Jacinto River, monthly medians were at a minimum for either the beginning or end of the planning window, with most months reaching their highest median flows in 2030. This peaked flow distribution is similar to the pattern of annual medians for the bay which, as noted earlier, is attributable to an initial increase in flow caused by WMS return flows followed by a later decline due to diversions for reuse WMS. For Trinity Bay, monthly medians were primarily highest for 2010 prior to implementation of the upstream Region C reuse strategy and reached minimum values mainly between 2020 and 2040.

The monthly median flows for the complete Galveston Bay system represent the aggregated effects of increasing demand, WMS for Region H and Region C, and changing reservoir storage volumes across the planning window. As such, the individual monthly median values show less of a clear behavior than the annual medians for the bay system as a whole. Eight of the monthly medians were highest in 2010, with the other four medians highest in the middle of the planning period; the lowest monthly median B&E inflows vary considerably across the year.

Figure 4
Median Monthly B&E Flows



3.3 GBFIG Frequency of Target Attainment

In addition to examining median B&E flows into the Galveston Bay System, the *Environmental Flows Study* carried out by Region H during the 1st biennium of the 2011 planning round examined the frequency of meeting inflow targets established by Texas Water Development Board (TWDB) and Texas Parks and Wildlife Department (TPWD). The three target conditions as established by TWDB and TPWD are:

- Max H – sequence of monthly inflows for maximum B&E fisheries harvest
- Min Q – sequence of monthly inflows that minimizes the annual volume needed to maintain the B&E fisheries harvest
- Min Q-Sal – sequence of monthly inflows that maintains B&E salinity constraint

Monthly values for all three annual targets for the Galveston Bay System are given in *Table 1*.

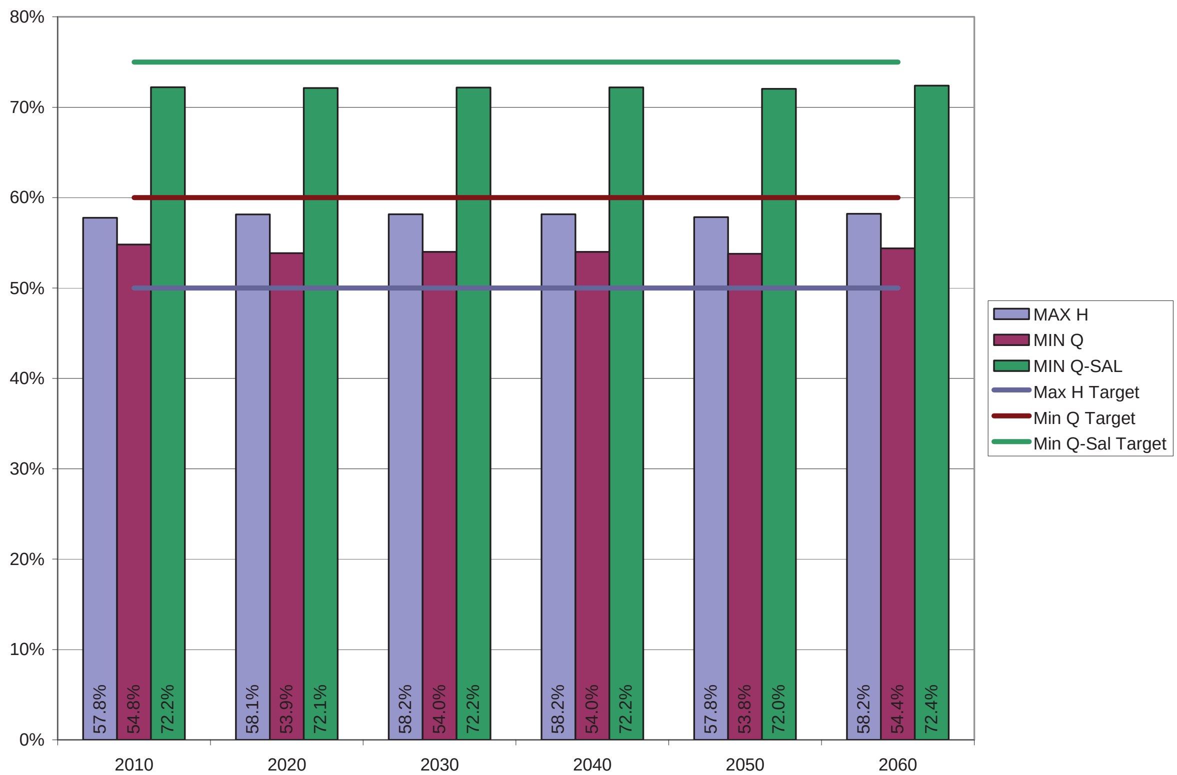
Table 1
Monthly Galveston Bay Inflow Targets

	Target Flow (ac-ft)		
Month	**Max H**	**Min Q**	**Min Q-Sal**
1	150,500	150,500	150,490
2	155,200	216,700	216,700
3	652,800	363,900	363,900
4	632,500	352,600	267,270
5	1,273,700	679,700	309,970
6	839,700	448,100	413,560
7	211,500	232,700	211,500
8	140,000	154,000	140,000
9	103,000	330,200	102,960
10	78,600	251,900	78,600
11	351,500	351,500	164,390
12	626,800	626,800	93,870
TOTAL	**5,215,800**	**4,158,600**	**2,513,210**

During the 2001 Regional Water Planning Cycle, Region H formally adopted targets for frequency of meeting these target flows (frequency of target attainment, or FTA) as proposed by the Galveston Bay Freshwater Inflows Group (GBFIG). Adopted GBFIG frequencies of attainment are 50 percent for Max H, 60 percent for Min Q, and 75 percent for Min Q-Sal.

As in the *Environmental Flows Study,* FTA was assumed to reach its goal for a month if the count of that month during the period of record exceeded the frequency goal. For example, if 75 percent or more of the Januarys in the period of record reached the Min Q-Sal flow target, the desired Min Q-Sal FTA for January was considered to be met. For annual FTA, a year was considered to meet its flow target if the total flow for that year was equal to or greater than the sum of the twelve monthly targets. Note that this is a simplified representation of FTA. It is important to remember that the State's Max H, Min Q, and Min Q-Sal flow regimes are not made up of individual flow targets but rather represent optimal harvest when all 12 months in a year are at or near the monthly target. Annual FTA for the six decadal simulations is given in *Figure 5.*

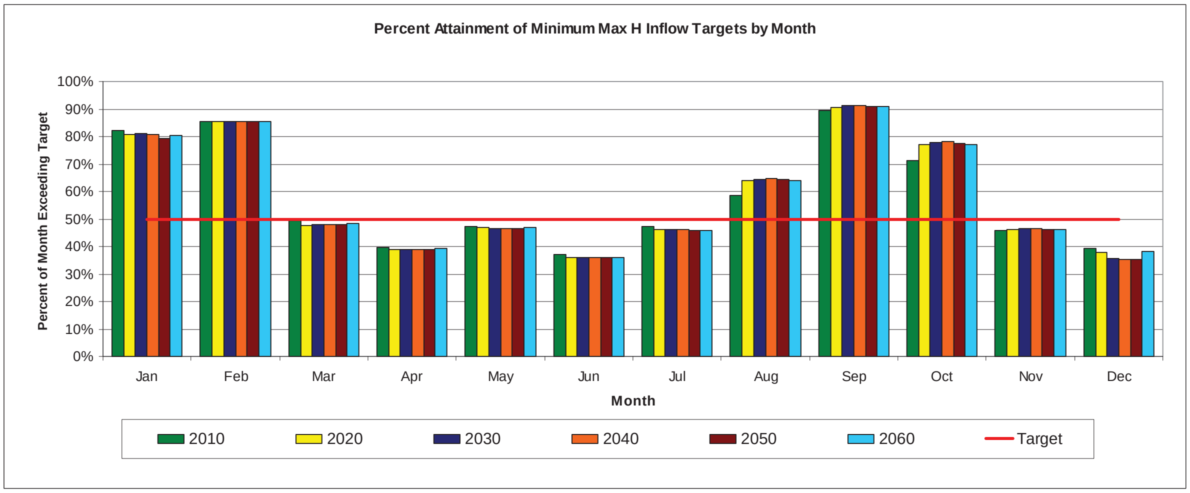
Figure 5
Annual Frequency of Target Attainment

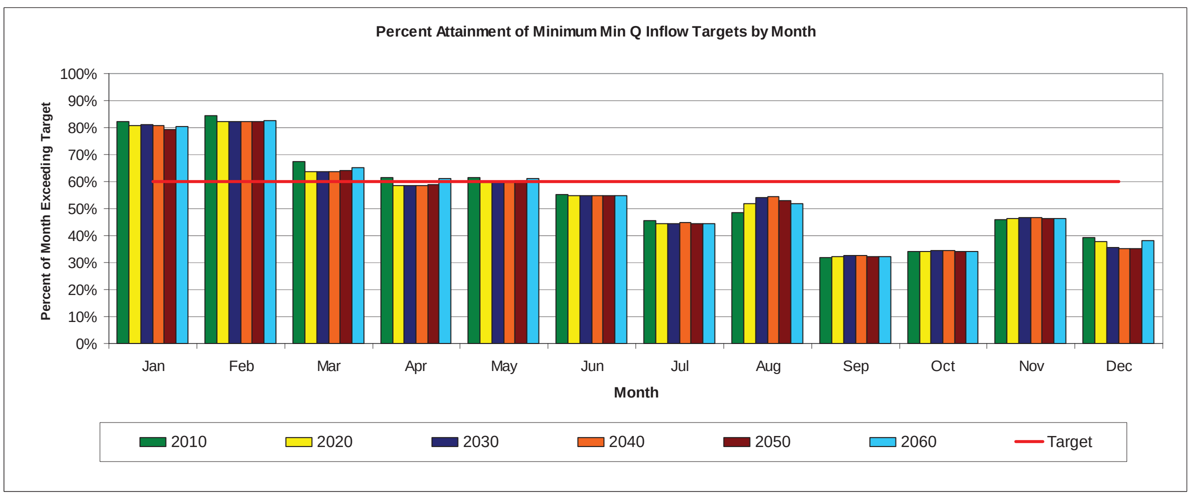


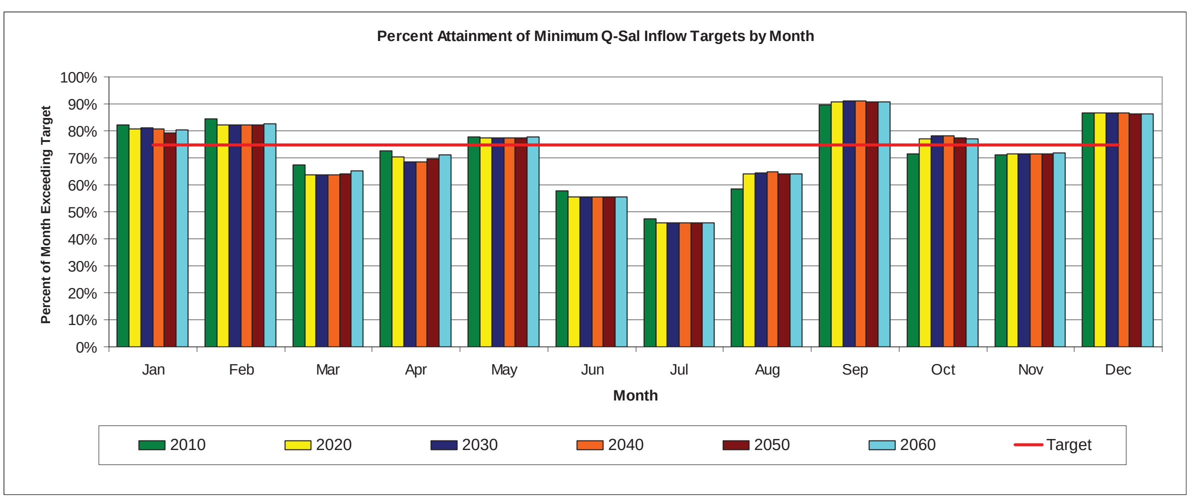
The *Environmental Flows Study* demonstrated that, while the three targets are met on an annual basis under naturalized conditions, the results to TCEQ's Current Conditions (Run 8) model do not achieve the desired FTA for Min Q. For the decadal strategy models executed for this study, annual FTA was only achieved for the Max H flow target. In spite of clear changes in median and tenth percentile flow across the planning window as described in *Sections 3.1* through *3.3*, annual FTA varied only slightly among the six decadal models. The greatest variability was found for Min Q, which nonetheless only varied by 1.04 percentage points across the six decadal models. Results for monthly FTA are shown in *Figure 6* on the following page.

For Max H, FTA is only met for five months of the year for all six decadal models. For Min Q, the desired FTA is not achieved for any model for June through December. Target FTA for April is not met for the 2020 through 2050 models and the target FTA for May is not met for the 2020 through 2040 models. For both April and May, the models which reach the desired FTA for Min Q barely reach the necessary number of months meeting the flow target. For Min Q-Sal, all six models meet the desired FTA for six months of the year. Given the differences in median annual and monthly bay and estuary inflows for the six models and the inter-annual variability for each simulation, one might expect greater variability in FTA for the State's B&E targets. In particular, it would seem likely that due to the change in flow between the 2010 and 2020 models that the FTA values would change drastically after 2010. However, as shown above on both an annual and monthly basis, this is not the case. While there is some change between the 2010 model and subsequent simulations, the range of variation among the models is typically less than 4 percentage points and never more than 7 percentage points.

Figure 6
Monthly Frequency of Target Attainment







As noted earlier, FTA is considered to be the proportion of a particular month for the model simulation period meeting the State's monthly flow target. For example, if 29 of the 57 Mays in the Year 2010 model meet or exceed May's Max H Target, the 2010 Max H FTA for May is 50.9 percent. This means that while the flow for individual monthly timesteps may vary from one decadal model to another, the total number of months not meeting the flow changes very little. An alternate approach to viewing meeting TWDB targets at GBFIG-recommended FTA is to look at the number of months missing the flow targets and the magnitude of shortages. This methodology is illustrated below for Max H, but the trends described are also true of Min Q and Min Q-Sal. The number of missed Max H targets by simulation for each month is included in *Table 2* below, confirming that the total number of monthly shortages varies only slightly.

Table 2
Number of Months Not Meeting Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	11	11	11	11	12	12
2	9	9	9	9	9	9
3	29	30	30	30	30	30
4	34	35	35	35	35	35
5	30	30	30	30	30	30
6	36	36	36	36	36	36
7	30	31	31	31	31	31
8	24	21	20	20	21	21
9	6	6	6	5	6	6
10	17	13	13	13	13	13
11	31	31	30	30	31	31
12	34	35	37	37	37	35

Table 3 shows the median shortage by month for each of the six decadal simulations.

Table 3
Median Shortages to Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	37,706	31,458	27,330	27,407	28,834	29,092
2	69,082	64,124	63,410	62,754	65,155	65,650
3	422,684	460,004	458,968	468,659	460,640	448,161
4	334,262	360,777	375,135	386,756	366,453	342,892
5	877,285	899,932	902,319	904,366	903,447	897,072
6	520,946	541,163	540,644	541,609	543,520	540,189
7	61,526	56,411	54,915	54,113	55,037	55,462
8	32,726	32,570	31,358	30,920	32,060	32,517
9	28,077	22,988	21,427	25,804	22,110	22,509
10	12,525	9,268	7,876	7,155	9,034	9,517
11	210,679	204,758	203,411	203,784	204,757	205,358
12	396,981	410,246	361,952	362,002	364,492	411,200

The median shortages listed in *Table 3* are substantial for most months; even for October, which has the lowest median shortages, the median shortage is in excess of 7,000 acre-feet. This suggests that months that fail to meet the target B&E inflow tend to do so by a wide margin. The median shortage alone cannot prove that this is the case. While much of the preceding study has relied heavily on median flows, in this case the median monthly shortage may not be the best indicator of shortage behavior as it is not the mid-sized shortages but rather the smallest shortages which are most likely to change from one decadal model to another. For this reason, examining the lower range of shortage values in conjunction provides a more reliable basis for determining why FTA has minimal variability. The 10th percentile B&E shortages are shown in *Table 4*.

Table 4
10th Percentile of Shortages to Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	3,799	12,564	10,976	11,049	5,048	3,347
2	28,807	23,869	21,580	21,680	24,498	25,091
3	215,801	217,138	221,079	221,206	219,255	210,977
4	74,232	104,461	101,539	98,175	97,380	87,360
5	347,062	381,333	382,117	382,016	379,083	368,224
6	123,010	157,100	160,498	162,211	161,302	148,379
7	23,437	18,234	15,239	15,170	16,481	16,934
8	4,034	5,210	7,296	6,494	4,282	4,746
9	12,772	7,171	4,884	11,839	6,141	6,625
10	4,255	5,227	3,865	3,171	4,952	5,412
11	69,365	69,092	69,583	70,221	68,502	64,296
12	81,968	126,710	65,286	67,043	62,670	114,660

As with the median, the 10th percentile shortages are large, strengthening the assertion that the number of months missing flow targets is fairly consistent due to shortages being large. For example, the monthly Max H target for May is not met for 30 out of 57 years for all six decadal simulations. The 10th percentile shortage for May is in excess of 300,000, meaning that almost all of the Mays that miss the TWDB/TPWD target do so by a large amount. Thus, it is unlikely that the management strategies implemented in the decadal models would alter B&E inflow by this degree for any particular month, thereby eliminating a shortage and increasing FTA. An examination of shortage volumes by model for all months of the simulation period reveals that, although a few large shortages are create or eliminated with changing model conditions, very few shortages greater than a few thousand acre-feet per month or created or eliminated among the decadal models. Thus, the majority of modeled monthly shortages are large and implementation of WMS in decades subsequent to 2010 are unlikely to have a substantial impact on FTA for B&E inflow targets.

Appendix 4E

Environmental Flows Modeling for New WMS

This Page Intentionally
Left Blank

Section 1- Introduction

The *Environmental Flows Study* completed during the 1st biennium of the 2011 Regional Water plan (RWP) planning process revealed impacts to volume, timing, and location of bay and estuary inflows caused by water management strategy (WMS) implementation. Model results indicated that implementation of individual WMS would not have a substantial impact on net bay and estuary (B&E) inflow; however, the combined effect of multiple WMS resulted in some impacts to B&E flows in terms of volume.

The 1st biennium study examined strategies recommended by the 2006 Region H RWP and the 2007 State water Plan (SWP); the 2011 RWP contains 36 WMS strategies which were not included in the 2006 RWP. As such, the Region H Regional Planning Group elected to re-run the water availability models from the 1st biennium *Environmental Flows Study* to test the environmental impacts of new WMS on environmental flows. In order to determine the effects of WMS implementation, WAM models were developed for each WMS for any basin in which the WMS was active. Strategies were modeled in a manner similar to that used in the *Environmental Flows Study*, with WMS simulated using the Water Rights Analysis Package (WRAP) software package. Strategies were modeled on an individual basis and results were examined to determine attainment of B&E inflow targets and impacts of individual WMS to instream flows.

Section 2- Model Development

The Water Rights Analysis Package (WRAP [Wurbs 2007]) was developed as a tool for modeling water rights allocations and river and reservoir operations on a monthly time-step. In addition to this basic objective, the nature of the application allows for the modeling of various environmental conditions, especially the determination of instream flows and bay and estuary (B&E) flows as a result of operations within the basin. This process is made simpler by the constant maintenance of Water Availability Models (WAMs) for each basin in the State of Texas by the Texas Commission on Environmental Quality (TCEQ). These WAMs can then be modified as necessary and executed by WRAP to determine impacts from various changes. Currently, TCEQ maintains two versions of the WAMs for permitting purposes: 1) a full-diversion model with no return flows, known as the WAM Run 3, and 2) a current conditions model based on historical water use, known as the WAM Run 8. The period of record for both models contains the critical drought period for each basin.

2.1 Base Model

Models carried out for this study were based on the Scenario D model from the first biennium *Environmental Flows Study*. In order to develop the original D_0 base model in the 1st biennium study, changes were made to the TCEQ Run 3 model. Because the Run 3 model includes almost no return flows, Constant Inflow (CI) and Return Flow (RF) cards for each basin were imported from the Run 8 model if present in the Run 8. CI cards imported from Run 8 reflect flows from a current conditions diversion level. However, since the majority of CI cards represent groundwater inputs to the system, no adjustment was required. The exception was the San Jacinto Basin, which includes considerable surface water inflows. For the San Jacinto model, CI cards were scaled up to represent Full Authorized Diversion conditions.

In order to create a Full Authorized Diversions With Return Flows model, a program was developed to extract Run 8 return flows and insert them into the Run 3 model. The program scanned the Run 8 and Run 3 models and, for each model, developed a table of several parameters included on the WR (Water Right) cards. These included the control point, use, priority number, return flow parameters (Run 8 only), and water right identifier. The two tables were then compared and, for diversions with matching parameters, the Run 8 return flow data was copied into the corresponding Run 3 diversion. Non-matching records, or records for which no change was necessary, were not altered.

Year 2060 SV/SA (Storage Volume/Surface Area) records (if available) giving surface area and volume relationships for reservoirs replaced the existing Year 2000 SV/SA records to account for the loss of reservoir storage volume from the effects of sedimentation over time. For the Neches Trinity, Trinity-San Jacinto, and San Jacinto models, no other changes required consideration. Two of the basins, the Trinity and the Brazos/San Jacinto-Brazos, required modification due to the presence of WMS in portions of the basins located in areas outside of Region H.

For the Trinity model, upstream strategies from Region C were included. Sections of code related to these strategies were copied from a file representing Region C's WMS for the TWDB Streamflow Assessment Study found in the 2007 SWP. This file was provided by TWDB. In addition to altering the Strategy D DAT file, changes were also made to the DIS file due to the addition of several control points. For the Brazos/San Jacinto-Brazos model, changes were made based on Region G's 2001 WMS (Brazos G Regional Water Planning Group 2001) as modeled in the same TWDB study. As with the Trinity model, changes for Strategy D were made to both the DAT and DIS files. The resultant models, identified as D_0 models, represent Year 2060 conditions with Full Authorized Diversions and expected return flows, upstream WMS, and no term water rights. However, the D_0 model contained no Region H strategies.

2.2 2011 RWP WMS Models

Eighteen of the new WMS for the 2011 RWP were deemed suitable for modeling. The primary reason for a majority of unmodeled strategies was that the WMS generated no new yield but rather simply facilitated implementation of another strategy (either from the 2006 or 2011 RWP). Examples of this situation include major WWP treatment and transmission projects. The 18 strategies which were modeled are listed in Table 2-1 below, which describes the modeling methodology used for each WMS.

Table 1-1.

WMS Methodology

Model ID	WMS Name	Modeling Methodology
IGW	Interim Strategies	Add CI cards to reflect return flows from points of use.
NWL	New Groundwater Wells for Livestock	Add CI cards to reflect return flows from points of use.
FRU	Fulshear Reuse	Reduce return flows (CI cards) at participating WUGs.
COH	COH GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
CMC	City of Missouri City GRP	Return flows from WUGs getting more groundwater or ASR. For reuse divert WWTP discharge with appropriate return flow.
M25	Fort Bend MUD 25 GRP	For direct reuse reduce CI card for WWTP discharge.
NFB	NFBWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
NHC	NHCRWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
SJW	SJRA WRAP	Return flows from WUGs getting more groundwater or Lake Conroe water.
SLG	Sugar Land GRP	Return flows from WUGs getting more groundwater. For reuse divert WWTP discharge with appropriate return flow.
WHC	WHCRWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
WCS	CLCND West Chambers System	Reflect return flows from points of use.
GOC	GCWA Off-channel Reservoir	Add off-channel diversion and reservoir
MCR	Montgomery MUD 8/9 Indirect Reuse	Reuse diversion with appropriate return flows.
RMI	Wastewater Reclamation for Mun. Irrigation	Reduce return flows (CI cards) at participating WUGs.
FBO	Fort Bend County Off-Channel Reservoir	Add off-channel diversion and reservoir.
BCO	Brazoria County Off-Channel Reservoir	Add off-channel diversion and reservoir.
BII	Brazoria Co Interruptible Supplies for Irrigation	Add interruptible diversions

Section 3 – WMS Impacts to Environmental Flows

3.1 B&E Inflows

WRAP strategy model output was used to determine effects of WMS implementation on B&E flows into Galveston Bay for the Year 2060 condition. Targets were examined primarily in terms of frequency of target attainment (FTA) for B&E inflow targets recommended by the TWDB and Texas Parks and Wildlife Department. There are three sets of targets designed for maintaining fisheries. These are:

- Max H – sequence of monthly inflows for maximum B&E fisheries harvest
- Min Q – sequence of monthly inflows that minimizes the annual volume needed to maintain the B&E fisheries harvest
- Min Q-Sal – sequence of monthly inflows that maintains B&E salinity constraint

Monthly values for all three annual targets for the Galveston Bay system are given in *Table ES-2* below. In general, Max H represents a target condition for ultimate production while Min Q-Sal represents a base condition that must be maintained on a more reliable basis.

Table 3-1

Monthly Galveston Bay Inflow Targets

Month	Max H	Min Q	Min Q-Sal
1	150,500	150,500	150,490
2	155,200	216,700	216,700
3	652,800	363,900	363,900
4	632,500	352,600	267,270
5	1,273,700	679,700	309,970
6	839,700	448,100	413,560
7	211,500	232,700	211,500
8	140,000	154,000	140,000
9	103,000	330,200	102,960
10	78,600	251,900	78,600
11	351,500	351,500	164,390
12	626,800	626,800	93,870
TOTAL	**5,215,800**	**4,158,600**	**2,513,210**

Region H formally adopted GBFIG-proposed frequencies for meeting TWDB flow targets during the 2001 cycle of Regional Water Planning. GBFIG proposed a 50 percent frequency of attainment for Max H, 60 percent for Min Q, and 75 percent for Min Q-Sal (2006 Region H RWP). GBFIG-proposed frequencies were presented to the Region H Planning Group during the 2001 Regional Water Planning cycle and were adopted by the Region H Planning Group for the 2001 RWP. For additional information and documentation, please see the 2001 and 2006 Region H RWPs. However, the

GBFIG recommendations do not explicitly address how to measure frequency of attaining these targets, nor do they define a desired frequency for the seasonality (i.e., monthly distribution) of freshwater inflows. For this study, the recommended annual frequency was used as a placeholder for the evaluation of seasonal variations (i.e., monthly distribution). Targets were assumed to be attained for a time period in which the flow met or exceeded the target.

There are several considerations that should be taken into account when interpreting the FTA results. A concern with the approach taken is the validity of assuming that annual GBFIG targets are applicable on a seasonal or monthly basis. Sub-annual time scales are clearly of importance; it is mathematically possible to meet an annual flow target while flows for one or more months could be low enough to be ecologically inadequate. Whether FTA is more critical for some seasons or months than others has not yet been established. The application of the annual GBFIG FTA to monthly targets was made due to a lack of a more reasonable alternative and should be studied further.

While the purpose of this study is not to evaluate B&E needs or develop new flow targets or FTA, the underlying assumption that B&E flow needs are met if the desired FTA is achieved must be considered critically. One potential concern is that this approach does not consider a bracket of flows, but only if the flow equals or exceeds the desired B&E flow. This does not account for the possibility that, in some circumstances, excessive flows may also result in less than optimum conditions. It is important to remember that the State's Max H, Min Q, and Min Q-Sal flow regimes are not made up of individual flow targets but rather represent optimal harvest when all 12 months in a year are at or near the monthly target. However, Espey Consultants (2008) has noted that the pattern of flows defined by Max H does not occur historically; in order to meet the 50% frequency on Max H, the monthly Max H targets would have to be bracketed by ±1,045 percent.

Seasonal FTA is shown in *Table 3-2* below, with monthly FTA shown in *Table 3-3.* Changes from the base model are shown in bold text.

This Page Intentionally

Left Blank.

Table 3-2

Seasonal Frequency of Target Attainment for B&E Flow Targets

Max H

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%
Summer	70%	70%	70%	70%	71%	70%	70%	70%	70%	70%	71%	70%	70%	70%	71%	70%	70%	71%	70%
Winter	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%

Min Q

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	64%	64%	64%	64%	65%	64%	64%	65%	64%	64%	65%	65%	64%	64%	65%	64%	64%	65%	64%
Summer	40%	40%	40%	40%	41%	40%	40%	40%	40%	40%	41%	40%	40%	40%	41%	40%	40%	41%	40%
Winter	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%

Min Q-Sal

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
Summer	70%	70%	70%	70%	71%	70%	70%	70%	70%	70%	71%	70%	70%	70%	71%	70%	70%	71%	70%
Winter	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%

Table 3-3a

Monthly Frequency of Target Attainment for B&E Flow Targets – Max H

Max H																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%
Mar	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Apr	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%
May	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
Jun	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%
Jul	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%
Aug	65%	65%	65%	65%	**66%**	65%	65%	65%	65%	65%	65%	65%	65%	65%	64%	65%	65%	65%	65%
Sep	91%	91%	91%	91%	**92%**	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	**92%**
Oct	78%	78%	78%	78%	**80%**	**79%**	78%	78%	78%	78%	78%	78%	78%	78%	78%	**80%**	78%	78%	**79%**
Nov	47%	47%	47%	47%	**48%**	**48%**	47%	47%	**48%**	47%	47%	47%	**48%**	47%	47%	**48%**	47%	47%	**48%**
Dec	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	**46%**	47%	47%	47%	47%

Table 3-3b

Monthly Frequency of Target Attainment for B&E Flow Targets – Min Q

BCO																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Mar	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Apr	69%	69%	69%	69%	**70%**	69%	69%	69%	**70%**	69%	69%	69%	69%	69%	69%	**70%**	69%	69%	**70%**
May	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%
Jun	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	55%	56%	56%	56%	56%
Jul	44%	44%	44%	44%	45%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%
Aug	51%	51%	51%	51%	**53%**	51%	51%	51%	51%	51%	51%	51%	51%	51%	**50%**	**53%**	51%	51%	51%
Sep	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%
Oct	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Nov	47%	47%	47%	47%	**48%**	**48%**	47%	47%	**48%**	47%	47%	47%	**48%**	47%	47%	**48%**	47%	47%	**48%**
Dec	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	**46%**	47%	47%	47%	47%

Table 3-3c

Monthly Frequency of Target Attainment for B&E Flow Targets – Min Q-Sal

Min Q-Sal																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Mar	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Apr	75%	75%	75%	75%	**76%**	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	**76%**	75%	75%	75%
May	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Jun	58%	58%	58%	58%	**59%**	58%	58%	58%	58%	58%	58%	58%	58%	58%	58%	**59%**	58%	58%	58%
Jul	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%
Aug	65%	65%	65%	65%	**66%**	65%	65%	65%	65%	65%	65%	65%	65%	65%	**64%**	65%	65%	65%	65%
Sep	91%	91%	91%	91%	**92%**	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	**92%**
Oct	78%	78%	78%	78%	**80%**	**79%**	78%	78%	78%	78%	78%	78%	78%	78%	78%	80%	78%	78%	**79%**
Nov	73%	73%	73%	73%	**74%**	74%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	**74%**
Dec	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%

As can be seen from the tables above, the WMS modeled have very little impact on frequency of target attainment. For the adopted goal frequencies of attainment (50 percent for Max H, 60 percent for Min Q, and 75 percent for Min Q-sal), the base model itself fails to reach the desired FTA for a number of months and seasons. At a seasonal level, none of the new WMS examined alters FTA more than 0.5 percent, At the monthly level, changes were noted in greatest amounts for COH GRP, Wastewater Reuse for Municipal Irrigation, SJRA WRAP, and WHCRWA GRP; these changes were shown to occur primarily between August and October. However, FTA changes by less than two percent from the base model (typically no change). This indicates that on an individual basis the WMS have little impact on B&E flows. A similar conclusion was drawn from the results of the first biennium *Environmental Flows Study.*

3.2 Instream Flows

A list of 26 segments with the potential to be impacted by Region H WMS was developed from a compilation of segments studied in the TWDB Streamflow Assessment found in the 2002 SWP. Regulated flows at the 26 segments were determined for the base (D_0) models as well as for all WMS models. Based on monthly results for the model simulation period, 10th percentile flows were calculated to investigate low flow conditions. For each WMS, 10th percentile flows at each of the 26 segments were compared to the D_0 models. For each WMS, the stream segment with the greatest (absolute) percentage difference from the base model was considered to be the most critical segment for that strategy (see *Exhibit 2*). For the 18 strategy models, six segments were identified in the Brazos, San Jacinto-Brazos and San Jacinto Basins as being particularly influenced by Region H WMS. A summary of the most impacted segments is presented in *Table 4-1.*

Table 4-1

Impacts of WMS Implementation on Critical Stream Segments

WRAP Identifier	Basin	Strategy	10th Percentile Flows		
			D_0 (ac-ft)	Strategy (ac-ft)	Change (%)
CON111	Brazos	Braz. Int. Irrigation	47,571	44,972	-5.5
		GCWA Off-Channel		44,972	-5.5
		Sugar Land GRP		44,623	-6.2
BRBR59	Brazos	Brazoria OCR	49,304	47,695	-3.3
		Missouri City GRP		46,698	-5.3
		Fulshear Reuse		47,854	-2.9
		FBC MUD 25 Reuse		48,063	-2.5
		NFBWA GRP		47,213	-4.2
		New Wells for Livestock		46,424	-5.8
		Reclamation Mun. Irr.		47,248	-4.2
532801	Brazos	Fort Bend OCR	41,101	40,513	-1.4
SJGBC3	San Jacinto-Brazos	Interim Strategies	1,955	2,113	8.0
A5191P	San Jacinto	WHCRWA GRP	59,845	60,532	1.2
SPSP	San Jacinto	NHCRWA GRP	1,460	1,727	18.2
		SJRA WRAP		3,311	126.3
1009	San Jacinto	COH GRP	1,996	2,116	6.1

In the San Jacinto and San Jacinto-Brazos basins, the WMS showed increases in 10th percentile flow at critical segments, primarily due to increased return flows from points of use from WUGs increasing their usage of groundwater over time. Note that at the same time that these WUGs are increasing their groundwater use, other WUGs participating in the same GRPs will be converting to surface water, so that the total percentage of water usage in the GRP group will be within subsidence district limits. Increased return flows from WUGs converting from groundwater to surface water were not modeled as return flows would for those WUGs would simply shift from groundwater-based to surface water-based. Ultimately, the changes in 10th percentile flow caused by GRPs is largely an artifact of increasing demand. The increase in 10th percentile flows for Interim Strategies is also caused by increased groundwater-based return flows from point-of-use WUGs.

The most highly impacted segments in the Brazos basin all showed decreases in 10th percentile flows, although changes tended to be relatively small (6.2 percent or less). This reduction in flows is not surprising for reclamation / reuse strategies, as flows that would formerly move downstream are reduced. The reduction in flow caused by Brazoria County Interruptible Supplies for Irrigation is also reasonable, as a greater volume of water is being diverted beyond the firm yield of existing permits (possibly during lower-flow periods). Similarly, the GCWA Off-Channel Reservoir, Fort Bend OCR, and Brazoria County OCR would firm up interruptible portions of flow, resulting in greater total diversions from the stream system. The reduction in flow caused by the Missouri City and Sugar Land GRPs may initially seem counterintuitive, as the remaining GRPs listed resulted in positive increases in streamflow. However, please note that these two GRPs also include a reuse component which could lower 10th percentile flows at some locations.

Section 4 - Conclusions

As shown in the sections above, the impacts of new individual WMS as detailed in the 2011 Region H RWP are not anticipated to create major impacts to B&E flows, nor to substantially reduce low (10^{th} percentile) flows at critical stream segments. Frequencies of attaining B&E flow targets at GBFIG-established frequencies was almost unchanged, with changes noted for only a few strategies; even for those strategies, changes were within two percentage points of the base model. Both positive and negative changes to 10th percentile flows at critical segments were found, with positive changes occurring in the San Jacinto and San Jacinto-Brazos basins and negative changes in the Brazos basin. Overall, the negative changes were relatively small, ranging from 2.5 to 6.2 percent reduction in 10^{th} percentile flow at the critical segments. The impact to critical stream segment low flows should be considered when evaluating WMS, particularly for projects consisting wholly or partly of reuse. Overall, however, the small magnitude of change for critical segments and the limited impacts on B&E inflow suggests that the seventeen WMS are not likely to individually create substantial alterations to B&E inflows or critical stream segment low flows.

Whether these strategies will have an additive effect when implemented together is unknown; based on the results of the 1^{st} biennium *Environmental Flows Study*, it is possible that greater impacts would be realized with when the projects are operating simultaneously. More study would be required to determine if this is the case for new WMS.

This Page Intentionally Left Blank.

Appendix 4F

TWDB Report: Socioeconomic Impacts of Unmet Water Demands in the Region H Water Planning Area

This Page Intentionally
Left Blank

Socioeconomic Impacts of Projected Water Shortages for the Region H Regional Water Planning Area

Prepared in Support of the 2011 Region H Regional Water Plan

Stuart D. Norvell, Managing Economist
Water Resources Planning Division
Texas Water Development Board
Austin, Texas

S. Doug Shaw, Agricultural Economist
Water Resources Planning Division
Texas Water Development Board
Austin, Texas

May 2010

Table of Contents

Tables

Introduction

Water shortages during drought would likely curtail or eliminate economic activity in business and industries reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline, and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on existing businesses and industry, but they could also adversely affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Administrative rules require that regional water planning groups evaluate the impacts of not meeting water needs as part of the regional water planning process, and rules direct TWDB staff to provide technical assistance: *"The executive administrator shall provide available technical assistance to the regional water planning groups, upon request, on water supply and demand analysis, including methods to evaluate the social and economic impacts of not meeting needs"* [(§357.7 (4)(A)]. Staff of the TWDB's Water Resources Planning Division designed and conducted this report in support of the Region H Regional Water Planning Group (Region H).

This document summarizes the results of our analysis and discusses the methodology used to generate the results. Section 1 outlines the overall methodology and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 2 presents the results for each category where shortages are reported at the regional planning area level and river basin level. Results for individual water user groups are not presented, but are available upon request.

1. Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Economic Impacts of Water Shortages

1.1.1 General Approach

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts or benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. When analyzing the economic impacts of water shortages as defined in Texas water planning, three potential scenarios are possible:

1) Scenario 1 involves situations where there are physical shortages of raw surface or groundwater due to drought of record conditions. For example, City A relies on a reservoir with average conservation storage of 500 acre-feet per year and a firm yield of 100 acre feet. In 2010, the city uses about 50 acre-feet per year, but by 2030 their demands are expected to increase to 200

acre-feet. Thus, in 2030 the reservoir would not have enough water to meet the city's demands, and people would experience a shortage of 100 acre-feet assuming drought of record conditions. Under normal or average climatic conditions, the reservoir would likely be able to provide reliable water supplies well beyond 2030.

2) Scenario 2 is a situation where despite drought of record conditions, water supply sources can meet existing use requirements; however, limitations in water infrastructure would preclude future water user groups from accessing these water supplies. For example, City B relies on a river that can provide 500 acre-feet per year during drought of record conditions and other constraints as dictated by planning assumptions. In 2010, the city is expected to use an estimated 100 acre-feet per year and by 2060 it would require no more than 400 acre-feet. But the intake and pipeline that currently transfers water from the river to the city's treatment plant has a capacity of only 200 acre-feet of water per year. Thus, the city's water supplies are adequate even under the most restrictive planning assumptions, but their conveyance system is too small. This implies that at some point – perhaps around 2030 - infrastructure limitations would constrain future population growth and any associated economic activity or impacts.

3) Scenario 3 involves water user groups that rely primarily on aquifers that are being depleted. In this scenario, projected and in some cases existing demands may be unsustainable as groundwater levels decline. Areas that rely on the Ogallala aquifer are a good example. In some communities in the region, irrigated agriculture forms a major base of the regional economy. With less irrigation water from the Ogallala, population and economic activity in the region could decline significantly assuming there are no offsetting developments.

Assessing the social and economic effects of each of the above scenarios requires various levels and methods of analysis and would generate substantially different results for a number of reasons; the most important of which has to do with the time frame of each scenario. Scenario 1 falls into the general category of static analysis. This means that models would measure impacts for a small interval of time such as a drought. Scenarios 2 and 3, on the other hand imply a dynamic analysis meaning that models are concerned with changes over a much longer time period.

Since administrative rules specify that planning analysis be evaluated under drought of record conditions (a static and random event), socioeconomic impact analysis developed by the TWDB for the state water plan is based on assumptions of Scenario 1. Estimated impacts under scenario 1 are point estimates for years in which needs are reported (2010, 2020, 2030, 2040, 2050 and 2060). They are independent and distinct "what if" scenarios for a particular year and shortages are assumed to be temporary events resulting from drought of record conditions. Estimated impacts measure what would happen if water user groups experience water shortages for a period of one year.

The TWDB recognize that dynamic models may be more appropriate for some water user groups; however, combining approaches on a statewide basis poses several problems. For one, it would require a complex array of analyses and models, and might require developing supply and demand forecasts under "normal" climatic conditions as opposed to drought of record conditions. Equally important is the notion that combining the approaches would produce inconsistent results across regions resulting in a so-called "apples to oranges" comparison.

A variety tools are available to estimate economic impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Since the planning horizon extends through 2060, economic variables in the baseline are adjusted in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Future values for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category.

The following steps outline the overall process.

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO™ (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[1] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously were estimated for each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industries within a given region;
- **final sales –** sales to end users in a region and exports out of a region**;**
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in constant year 2006 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted

[1]The IMPLAN database consists of national level technology matrices based on benchmark input-output accounts generated by the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment, and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to national totals using a matrix ratio allocation system and county data are balanced to state totals.

as "output" in an IO model. Thus, total sales double-count or overstate the true economic value of goods and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. Each IMPLAN sector was assigned to a specific water use category.

Step 2: *Estimate Direct and Indirect Economic Impacts of Water Needs*

Direct impacts are reductions in output by sectors experiencing water shortages. For example, without adequate cooling and process water a refinery would have to curtail or cease operation, car washes may close, or farmers may not be able to irrigate and sales revenues fall. Indirect impacts involve changes in inter-industry transactions as supplying industries respond to decreased demands for their services, and how seemingly non-related businesses are affected by decreased incomes and spending due to direct impacts. For example, if a farmer ceases operations due to a lack of irrigation water, they would likely reduce expenditures on supplies such as fertilizer, labor and equipment, and businesses that provide these goods would suffer as well.

Direct impacts accrue to immediate businesses and industries that rely on water and without water industrial processes could suffer. However, output responses may vary depending upon the severity of shortages. A small shortage relative to total water use would likely have a minimal impact, but large shortages could be critical. For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky.[2] As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production, but it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in

[2] Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[3] The efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

- if water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;
- if water needs are 5 to 30 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.50 percent reduction in output;
- if water needs are 30 to 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.75 percent reduction in output; and
- if water needs are greater than 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 1.0 percent (i.e., a proportional reduction).

In some cases, elasticities are adjusted depending upon conditions specific to a given water user group.

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. The formula for a given IMPLAN sector is:

$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$

where:

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Secondary impacts were derived using the same formula used to estimate direct impacts; however, indirect multiplier coefficients are used. Methods and assumptions specific to each water use sector are discussed in Sections 1.1.2 through 1.1.4.

---

[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages,*" Spectrum Economics, Inc. November, 1991.

General Assumptions and Clarification of the Methodology

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1. Shortages as reported by regional planning groups are the starting point for socioeconomic analyses.

2. Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct "what if" scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, regardless of whether or not there is a drought. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under "normal" or "most likely" future climatic conditions.

3. While useful for planning purposes, this study is not a benefit-cost analysis. Benefit cost analysis is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a benefit cost study if done so properly. Since this is not a benefit cost analysis, future impacts are not weighted differently. In other words, estimates are not discounted. If used as a measure of economic benefits, one should incorporate a measure of uncertainty into the analysis. In this type of analysis, a typical method of discounting future values is to assign probabilities of the drought of record recurring again in a given year, and weight monetary impacts accordingly. This analysis assumes a probability of one.

4. IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as "final sales," multipliers for the ranching sector do fully account for all losses to a region's economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from one water use category to another.

5. Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on "fixed-proportion production functions," which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a

scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses for employment and secondary losses in sales and employment should be considered an upper bound. Similarly, since projected population losses are based on reduced employment in the region, they should be considered an upper bound as well.

6. IO models are static. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in 2006. In contrast, water shortages are projected to occur well into the future. Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon, and the farther out into the future we go, this assumption becomes less reliable.

7. Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in most regions of Texas lasted several years.

8. Monetary figures are reported in constant year 2006 dollars.

1.1.2 Impacts to Agriculture

Irrigated Crop Production

The first step in estimating impacts to irrigation required calculating gross sales for IMPLAN crop sectors. Default IMPLAN data do not distinguish irrigated production from dry-land production. Once gross sales were known other statistics such as employment and income were derived using IMPLAN direct multiplier coefficients. Gross sales for a given crop are based on two data sources:

1) county-level statistics collected and maintained by the TWDB and the USDA Farm Services Agency (FSA) including the number of irrigated acres by crop type and water application per acre, and

2) regional-level data published by the Texas Agricultural Statistics Service (TASS) including prices received for crops (marketing year averages), crop yields and crop acreages.

Crop categories used by the TWDB differ from those used in IMPLAN datasets. To maintain consistency, sales and other statistics are reported using IMPLAN crop classifications. Table 1 shows the TWDB crops included in corresponding IMPLAN sectors, and Table 2 summarizes acreage and estimated annual water use for each crop classification (five-year average from 2003-2007). As shown in Table 2, the overwhelming majority of irrigation in Region H is for rice. Thus, in our analysis we disregard other crop types. Table 3 displays average (2003-2007) gross revenues per acre for rice production applied in the analysis.

Table 1: Crop Classifications Used in TWDB Water Use Survey and Corresponding IMPLAN Crop Sectors	
IMPLAN Category	**TWDB Category**
Oilseeds	Soybeans and “other oil crops”
Grains	Grain sorghum, corn, wheat and “other grain crops”
Vegetable and melons	“Vegetables” and potatoes
Tree nuts	Pecans
Fruits	Citrus, vineyard and other orchard
Cotton	Cotton
Sugarcane and sugar beets	Sugarcane and sugar beets
All “other” crops	“Forage crops”, peanuts, alfalfa, hay and pasture, rice and “all other crops”

Table 2: Summary of Irrigated Crop Acreage and Water Demand for the Region H Regional Water Planning Area (average 2003-2007)

Sector	Acres (1000s)	Distribution of Acres	Water Use (1000s of AF)	Distribution of Water Use
Oilseeds	1.0	2%	<1	<1%
Grains	<1	<1%	<1	<1%
Vegetable and melons	<1	<1%	<1	<1%
Tree nuts	<1	<1%	<1	<1%
Fruits	<1	<1%	<1	<1%
Cotton	0	0%	0	0%
Sugarcane and sugar beets	0	0%	0	0%
Rice	53	97%	291	99%
Total	55	100%	292	100%

Source: Water demand figures are a 5- year average (2003-2007) of the TWDB’s annual Irrigation Water Use Estimates. Statistics for irrigated crop acreage are based upon annual survey data collected by the TWDB and the Farm Service Agency. Values do not include acreage or water use for the TWDB categories classified by the Farm Services Agency as “failed acres,” “golf course” or “waste water.”

Table 3: Average Gross Sales Revenues per Acre for Irrigated Crops for the Region H Regional Water Planning Area (2003-2007)		
IMPLAN Sector	**Gross Revenues per Acre**	**Crops Included in Estimates**
All Other Crops	$570	Based on five-year (2003-2007) average weighted by acreage for "rice."
*Figures are rounded. Source: Based on data from the Texas Agricultural Statistics Service, Texas Water Development Board, and Texas A&M University.		

The following steps outline the overall process used to estimate direct impacts to irrigated agriculture:

1. *Distribute shortages across predominant crop types in the region*. Again, unmet water needs were distributed equally across crop sectors that constitute one percent or more of irrigated acreage.

2. *Estimate associated reductions in output for affected crop sectors*. Output reductions are based on elasticities discussed previously and on estimated values per acre for different crops. Values per acre stem from the same data used to estimate output for the year 2006 baseline. Using multipliers, we then generate estimates of forgone income, jobs, and tax revenues based on reductions in gross sales and final demand.

3. *Reduce sales revenues for forward processers in proportion to lost rice production*. As discussed in Section 1.1, input output models capture indirect losses to suppliers and other businesses that depend upon rice farming, but only those providing inputs to rice production. Multipliers do not capture potential impacts to forward processors, in this case rice mills, which add considerable value to the product and hence income and jobs to the state. For example, Texas rice farming directly generates about $60 to $80 in gross state product. Once the rice harvested it is sold to rice mills that process and resell the crop. This added value generates an additional $60 to $80 million in direct gross state product. Impacts measured in the study capture this additional value added.

Livestock

The approach used for the livestock sector is basically the same as that used for crop production. As is the case with crops, livestock categorizations used by the TWDB differ from those used in IMPLAN datasets, and TWDB groupings were assigned to a given IMPLAN sector (Table 4). Then we:

1) *Distribute projected water needs equally among predominant livestock sectors and estimate lost output*: As is the case with irrigation, shortages are assumed to affect all livestock sectors equally; however, the category of "other" is not included given its small size. If water needs were

small relative to total demands, we assume that producers would haul in water by truck to fill stock tanks. The cost per acre-foot ($24,000) is based on 2008 rates charged by various water haulers in Texas, and assumes that the average truck load is 6,500 gallons at a hauling distance of 60 miles.

3) *Estimate reduced output in forward processors for livestock sectors*. Reductions in output for livestock sectors are assumed to have a proportional impact on forward processors in the region such as meat packers. In other words, if the cows were gone, meat-packing plants or fluid milk manufacturers) would likely have little to process. This is not an unreasonable premise. Since the 1950s, there has been a major trend towards specialized cattle feedlots, which in turn has decentralized cattle purchasing from livestock terminal markets to direct sales between producers and slaughterhouses. Today, the meat packing industry often operates large processing facilities near high concentrations of feedlots to increase capacity utilization.[5] As a result, packers are heavily dependent upon nearby feedlots. For example, a recent study by the USDA shows that on average meat packers obtain 64 percent of cattle from within 75 miles of their plant, 82 percent from within 150 miles and 92 percent from within 250 miles.[6]

Table 4: Description of Livestock Sectors

IMPLAN Category	TWDB Category
Cattle ranching	Cattle, cow calf, feedlots and dairies
Poultry and egg production	Poultry production.
Other livestock	Livestock other than cattle and poultry (i.e., horses, goats, sheep, hogs)
Milk manufacturing	Fluid milk manufacturing, cheese manufacturing, ice cream manufacturing etc.
Meat packing	Meat processing present in the region from slaughter to final processing

1.1.3 Impacts to Municipal Water User Groups

Disaggregation of Municipal Water Demands

Estimating the economic impacts for the municipal water user groups is complicated for a number of reasons. For one, municipal use comprises a range of consumers including commercial businesses, institutions such as schools and government and households. However, reported water needs are not distributed among different municipal water users. In other words, how much of a municipal need is commercial and how much is residential (domestic)?

[5] Ferreira, W.N. "*Analysis of the Meat Processing Industry in the United States*." Clemson University Extension Economics Report ER211, January 2003.

[6] Ward, C.E. "*Summary of Results from USDA's Meatpacking Concentration Study*." Oklahoma Cooperative Extension Service, OSU Extension Facts WF-562.

The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources.[7] For example, if year 2006 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector is (30 x 200 = 6,000 gallons) or 6.7 acre-feet per year. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as "county-other." Based on our analysis, commercial water use is about 5 to 35 percent of municipal demand. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

After determining the distribution of domestic versus commercial water use, we developed methods for estimating impacts to the two groups.

Domestic Water Uses

Input output models are not well suited for measuring impacts of shortages for domestic water uses, which make up the majority of the municipal water use category. To estimate impacts associated with domestic water uses, municipal water demand and needs are subdivided into residential, and commercial and institutional use. Shortages associated with residential water uses are valued by estimating proxy demand functions for different water user groups allowing us to estimate the marginal value of water, which would vary depending upon the level of water shortages. The more severe the water shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic impacts would be much higher in the latter case because people, and would be forced to find emergency alternatives assuming alternatives were available.

To estimate the value of domestic water uses, TWDB staff developed marginal loss functions based on constant elasticity demand curves. This is a standard and well-established method used by economists to value resources such as water that have an explicit monetary cost.

A constant price elasticity of demand is estimated using a standard equation:

$$w = kc^{(-\varepsilon)}$$

where:

- w is equal to average monthly residential water use for a given water user group measured in thousands of gallons;
- k is a constant intercept;

[7] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not*: *The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

- c is the average cost of water per 1,000 gallons; and

- ε is the price elasticity of demand.

Price elasticities (-0.30 for indoor water use and -0.50 for outdoor use) are based on a study by Bell et al.[8] that surveyed 1,400 water utilities in Texas that serve at least 1,000 people to estimate demand elasticity for several variables including price, income, weather etc. Costs of water and average use per month per household are based on data from the Texas Municipal League's annual water and wastewater rate surveys - specifically average monthly household expenditures on water and wastewater in different communities across the state. After examining variance in costs and usage, three different categories of water user groups based on population (population less than 5,000, cities with populations ranging from 5,000 to 99,999 and cities with populations exceeding 100,000) were selected to serve as proxy values for municipal water groups that meet the criteria (Table 5).[9]

Table 5: Water Use and Costs Parameters Used to Estimated Water Demand Functions (average monthly costs per acre-foot for delivered water and average monthly use per household)

Community Population	Water	Wastewater	Total Monthly Cost	Avg. Monthly Use (gallons)
Less than or equal to 5,000	$1,335	$1,228	$2,563	6,204
5,000 to 100,000	$1,047	$1,162	$2,209	7,950
Great than or equal to 100,000	$718	$457	$1,190	8,409

Source: Based on annual water and wastewater rate surveys published by the Texas Municipal League.

As an example, Table 6 shows the economic impact per acre-foot of domestic water needs for municipal water user groups with population exceeding 100,000 people. There are several important assumptions incorporated in the calculations:

1) Reported values are net of the variable costs of treatment and distribution such as expenses for chemicals and electricity since using less water involves some savings to consumers and utilities alike; and for outdoor uses we do not include any value for wastewater.

2) Outdoor and "non-essential" water uses would be eliminated before indoor water consumption was affected, which is logical because most water utilities in Texas have drought contingency plans that generally specify curtailment or elimination of outdoor water use during droughts.[10] Determining how much water is used for outdoor purposes

[8] Bell, D.R. and Griffin, R.C. "*Community Water Demand in Texas as a Century is Turned*." Research contract report prepared for the Texas Water Development Board. May 2006.

[9] Ideally, one would want to estimate demand functions for each individual utility in the state. However, this would require an enormous amount of time and resources. For planning purposes, we believe the values generated from aggregate data are more than sufficient.

[10] In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of

is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of single family residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[11] Earlier findings of the U.S. Water Resources Council showed a national average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[12] A study conducted for the California Urban Water Agencies (CUWA) calculated average annual values ranging from 25 to 35 percent.[13] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study.

3) As shortages approach 100 percent values become immense and theoretically infinite at 100 percent because at that point death would result, and willingness to pay for water is immeasurable. Thus, as shortages approach 80 percent of monthly consumption, we assume that households and non-water intensive commercial businesses (those that use water only for drinking and sanitation would have water delivered by tanker truck or commercial water delivery companies. Based on reports from water companies throughout the state, we estimate that the cost of trucking in water is around $21,000 to $27,000 per acre-feet assuming a hauling distance of between 20 to 60 miles. This is not an unreasonable assumption. The practice was widespread during the 1950s drought and recently during droughts in this decade. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water when rain replenished the lake, and the city was able to refurbish old wells to provide supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water delivered to their homes by private contractors.[14] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[15]

"non-essential water uses." Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[11] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

[12] U.S. Environmental Protection Agency. "*Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[13] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

[14] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[15] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

Table 6: Economic Losses Associated with Domestic Water Shortages in Communities with Populations Exceeding 100,000 people				
Water shortages as a percentage of total monthly household demands	**No. of gallons remaining per household per day**	**No of gallons remaining per person per day**	**Economic loss (per acre-foot)**	**Economic loss (per gallon)**
1%	278	93	$748	$0.00005
5%	266	89	$812	$0.0002
10%	252	84	$900	$0.0005
15%	238	79	$999	$0.0008
20%	224	75	$1,110	$0.0012
25%	210	70	$1,235	$0.0015
30%[a]	196	65	$1,699	$0.0020
35%	182	61	$3,825	$0.0085
40%	168	56	$4,181	$0.0096
45%	154	51	$4,603	$0.011
50%	140	47	$5,109	$0.012
55%	126	42	$5,727	$0.014
60%	112	37	$6,500	$0.017
65%	98	33	$7,493	$0.02
70%	84	28	$8,818	$0.02
75%	70	23	$10,672	$0.03
80%	56	19	$13,454	$0.04
85%	42	14	$18,091 ($24,000)[b]	$0.05 ($0.07)[b]
90%	28	9	$27,363 ($24,000)	$0.08 ($0.07)
95%	14	5	$55,182 ($24,000)	$0.17 ($0.07)
99%	3	0.9	$277,728 ($24,000)	$0.85 ($0.07)
99.9%	1	0.5	$2,781,377 ($24,000)	$8.53 ($0.07)
100%	0	0	Infinite ($24,000)	Infinite ($0.07)

[a] The first 30 percent of needs are assumed to be restrictions of outdoor water use; when needs reach 30 percent of total demands all outdoor water uses would be restricted. Needs greater than 30 percent include indoor use.

[b] As shortages approach 100 percent the value approaches infinity assuming there are not alternatives available; however, we assume that communities would begin to have water delivered by tanker truck at an estimated cost of $24,000 per acre-foot when shortages breached 85 percent.

Commercial Businesses

Effects of water shortages on commercial sectors were estimated in a fashion similar to other business sectors meaning that water shortages would affect the ability of these businesses to operate. This is particularly true for “water intensive” commercial sectors that are need large amounts of water (in addition to potable and sanitary water) to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hospitals and medical facilities,
- hotels and lodging places, and
- eating and drinking establishments.

A key assumption is that commercial operations would not be affected until water shortages were at least 50 percent of total municipal demand. In other words, we assume that residential water consumers would reduce water use including all non-essential uses before businesses were affected.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City A experiences an unexpected shortage of 50 acre-feet per year when their demands are 200 acre-feet per year. Thus, shortages are only 25 percent of total municipal use and residents of City A could eliminate needs by restricting landscape irrigation. City B, on the other hand, has a deficit of 150 acre-feet in 2020 and a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and some indoor conservation measures could eliminate 50 acre-feet of projected needs, yet 50 acre-feet would still remain. To eliminate” the remaining 50 acre-feet water intensive commercial businesses would have to curtail operations or shut down completely.

Three other areas were considered when analyzing municipal water shortages: 1) lost revenues to water utilities, 2) losses to the horticultural and landscaping industries stemming for reduction in water available for landscape irrigation, and 3) lost revenues and related economic impacts associated with reduced water related recreation.

Water Utility Revenues

Estimating lost water utility revenues was straightforward. We relied on annual data from the “*Water and Wastewater Rate Survey*” published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, average retail water and sewer rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as “county-other” were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or “unaccountable” water that comprises things such as leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the “miscellaneous gross receipts tax, “which the state collects from utilities located in most incorporated cities or towns in Texas. We do not include lost water utility revenues when aggregating impacts of municipal water shortages to regional and state levels to prevent double counting.

Horticultural and Landscaping Industry

The horticultural and landscaping industry, also referred to as the "green Industry," consists of businesses that produce, distribute and provide services associated with ornamental plants, landscape and garden supplies and equipment. Horticultural industries often face big losses during drought. For example, the recent drought in the Southeast affecting the Carolinas and Georgia horticultural and landscaping businesses had a harsh year. Plant sales were down, plant mortality increased, and watering costs increased. Many businesses were forced to close locations, lay off employees, and even file for bankruptcy. University of Georgia economists put statewide losses for the industry at around $3.2 billion during the 3-year drought that ended in 2008.[16] Municipal restrictions on outdoor watering play a significant role. During drought, water restrictions coupled with persistent heat has a psychological effect on homeowners that reduces demands for landscaping products and services. Simply put, people were afraid to spend any money on new plants and landscaping.

In Texas, there do not appear to be readily available studies that analyze the economic effects of water shortages on the industry. However, authors of this report believe negative impacts do and would result in restricting landscape irrigation to municipal water consumers. The difficulty in measuring them is two-fold. First, as noted above, data and research for these types of impacts that focus on Texas are limited; and second, economic data provided by IMPLAN do not disaggregate different sectors of the green industry to a level that would allow for meaningful and defensible analysis.[17]

Recreational Impacts

Recreational businesses often suffer when water levels and flows in rivers, springs and reservoirs fall significantly during drought. During droughts, many boat docks and lake beaches are forced to close, leading to big losses for lakeside business owners and local communities. Communities adjacent to popular river and stream destinations such as Comal Springs and the Guadalupe River also see their business plummet when springs and rivers dry up. Although there are many examples of businesses that have suffered due to drought, dollar figures for drought-related losses to the recreation and tourism industry are not readily available, and very difficult to measure without extensive local surveys. Thus, while they are important, economic impacts are not measured in this study.

Table 7 summarizes impacts of municipal water shortages at differing levels of magnitude, and shows the ranges of economic costs or losses per acre-foot of shortage for each level.

[16] Williams, D. *"Georgia landscapers eye rebound from Southeast drought."* Atlanta Business Chronicle, Friday, June 19, 2009

[17] Economic impact analyses prepared by the TWDB for 2006 regional water plans did include estimates for the horticultural industry. However, year 2000 and prior IMPLAN data were disaggregated to a finer level. In the current dataset (2006), the sector previously listed as "Landscaping and Horticultural Services" (IMPLAN Sector 27) is aggregated into "Services to Buildings and Dwellings" (IMPLAN Sector 458).

Table 7: Impacts of Municipal Water Shortages at Different Magnitudes of Shortages		
Water shortages as percent of total municipal demands	Impacts	Economic costs per acre-foot*
0-30%	✓ Lost water utility revenues ✓ Restricted landscape irrigation and non-essential water uses	$730 - $2,040
30-50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use	$2,040 - $10,970
>50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use ✓ Restriction or elimination of commercial water use ✓ Importing water by tanker truck	$10,970 - varies
*Figures are rounded		

1.1.4 Industrial Water User Groups

Manufacturing

Impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. For example, if a planning group estimates that during a drought of record water supplies in County A would only meet 50 percent of total annual demands for manufactures in the county, we reduced output for each sector by 50 percent. Since projected manufacturing demands are based on TWDB Water Uses Survey data for each county, we only include IMPLAN sectors represented in the TWBD survey database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable purposes. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes both databases were cross referenced in county with shortages. Non-matches were excluded when calculating direct impacts.

Mining

The process of mining is very similar to that of manufacturing. We assume that within a given county, shortages would apply equally to relevant mining sectors, and IMPLAN sectors are cross referenced with TWDB data to ensure consistency.

In Texas, oil and gas extraction and sand and gravel (aggregates) operations are the primary mining industries that rely on large volumes of water. For sand and gravel, estimated output reductions are straightforward; however, oil and gas is more complicated for a number of reasons. IMPLAN does not necessarily report the physical extraction of minerals by geographic local, but rather the sales revenues reported by a particular corporation.

For example, at the state level revenues for IMPLAN sector 19 (oil and gas extraction) and sector 27 (drilling oil and gas wells) totals $257 billion. Of this, nearly $85 billion is attributed to Harris County. However, only a very small fraction (less than one percent) of actual production takes place in the county. To measure actual potential losses in well head capacity due to water shortages, we relied on county level production data from the Texas Railroad Commission (TRC) and average well-head market prices for crude and gas to estimate lost revenues in a given county. After which, we used to IMPLAN ratios to estimate resultant losses in income and employment.

Other considerations with respect to mining include:

1) Petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as enhanced or water flood extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level TRC data that show the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.

2) A substantial portion of output from mining operations goes directly to businesses that are classified as manufacturing in our schema. Thus, multipliers measuring backward linkages for a given manufacturer might include impacts to a supplying mining operation. Care was taken not to double count in such situations if both a mining operation and a manufacturer were reported as having water shortages.

Steam-electric

At minimum without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline. Low water levels could affect raw water intakes and outfalls at electrical generating units in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low water levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[18] However, the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This would affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity.

---

[18] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

Among all water use categories steam-electric is unique and cautions are needed when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenues. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several electrical generating units in a given region. If one unit became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily on water such as gas powered turbines might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[19] Thus, depending upon the severity of the shortages and conditions at a given electrical generating unit, energy supplies for local and regional communities could be maintained. But in general, without enough cooling water, utilities would have to throttle back plant operations, forcing them to buy or generate more costly power to meet customer demands.

Measuring impacts end users of electricity is not part of this study as it would require extensive local and regional level analysis of energy production and demand. To maintain consistency with other water user groups, impacts of steam-electric water shortages are measured in terms of lost revenues (and hence income) and jobs associated with shutting down electrical generating units.

1.2 Social Impacts of Water Shortages

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are harder to quantify. Nevertheless, social effects associated with drought and water shortages are closely tied to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[20]

[19] Today, most utilities participate in large interstate "power pools" and can buy or sell electricity "on the grid" from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place such as transmission constraints; utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

[20] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. "*Social Impact Assessment*." in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on demographic projection models developed by the Texas State Data Center and used by the TWDB for state and regional water planning. Basically, the social impact model uses results from the economic component of the study and assesses how changes in labor demand would affect migration patterns in a region. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

2. Results

Section 2 presents the results of the analysis at the regional level. Included are baseline economic data for each water use category, and estimated economics impacts of water shortages for water user groups with reported deficits. According to the 2011 *Region H Regional Water Plan*, during severe drought irrigation, municipal, manufacturing, mining and steam-electric water user groups would experience water shortages in the absence of new water management strategies.

2.1 Overview of Regional Economy

On an annual basis, the Region H economy generates slightly more than $373 billion in gross state product for Texas ($342 billion in income and $31 billion in state and local business taxes) and supports 3,386,000 jobs (Table 8). Generating nearly $79 billion worth of income per year manufacturing (particularly petrochemical refining) is the primary base economic sector in the region and state.[21] Municipal sectors also generate substantial amounts of activity, nearly $212 billion per year in gross state product, and are major employers in the region. While municipal sectors are the largest employer and source of wealth, many businesses that make up the municipal category such as restaurants and retail stores are non-basic industries meaning they exist to provide services to people who work would in base industries such as manufacturing, agriculture and mining. In other words, without base industries such agriculture, many municipal jobs in the region would not exist.

[21] Base industries are those that supply markets outside of a region. These industries are crucial to the local economy and are called the economic base of a region. Appendix A shows how IMPLAN's 529 sectors were allocated to water use category, and shows economic data for each sector.

Table 8: The Region H Economy by Water User Group ($millions)[a]						
Water Use Category	**Total sales**	**Intermediate sales**	**Final sales**	**Jobs**	**Income**	**Business taxes**
Irrigation[b]	$401.01	$46.25	$354.76	966	$69.22	$3.73
Livestock	$1,812.22	$772.84	$1,039.38	15,033	$210.98	$17.29
Manufacturing	$377,287.75	$120,954.26	$256,333.49	493,526	$75,600.29	$2,527.00
Mining	$100,671.55	$69,837.10	$30,834.44	124,166	$56,104.32	$6,280.56
Steam-electric	$25,548.42	$7,187.34	$18,361.09	12,412	$17,800.89	$2,967.22
Municipal	$333,733.23	$116,264.88	$217,468.36	2,740,308	$192,557.01	$19,069.36
Regional total	$839,461.58	$315,061.19	$524,048.55	3,386,006	$342,302.00	$30,862.53

[a] Appendix 1 displays data for individual IMPLAN sectors that make up each water use category. Based on data from the Texas Water Development Board, and year 2006 data from the Minnesota IMPLAN Group, Inc.

[b] Irrigation includes activity for both rice farms and rice mills.

2.2 Impacts of Agricultural Water Shortages

According to the 2011 *Region H Regional Water Plan*, during severe drought the counties of Brazoria, Chambers, Galveston, Liberty, and Waller would experiences shortages of irrigation water without new management strategies. In 2010, shortages range from about 15 to 90 percent of annual irrigation demands. Shortages of these magnitudes would reduce gross state product (income plus state and local business taxes) by an estimated $68 million in 2010 and $61 million in 2060 with potential job losses ranging from 849 to 730. These figures include impacts to rice mills.

Table 9: Economic Impacts of Water Shortages for Irrigation Water User Groups ($millions)			
Decade	**Lost income from reduced rice production and milling activity [a]**	**Lost state and local tax revenues from reduced rice production and milling activity**	**Lost jobs from rice production and milling activity**
2010	$68.19	$7.89	849
2020	$62.37	$7.22	769
2030	$59.88	$6.93	739
2040	$58.65	$6.79	722
2050	$59.82	$6.92	726
2060	$61.15	$7.08	730

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.3 Impacts of Municipal Water Shortages

Water shortages are projected to occur in a significant number of communities in Region H. At the regional level, the estimated economic value of domestic water shortages totals $97 million in 2010 and $4,798 million in 2060 (Table 10). Municipal shortages would also restrict the operation of many commercial businesses reducing gross state product by an estimated $30 million in 2010 and $2,738 million in 2060.

Table 10: Economic Impacts of Water Shortages for Municipal Water User Groups ($millions)

Decade	Monetary value of domestic water shortages	Lost income from reduced commercial business activity*	Lost state and local taxes from reduced commercial business activity	Lost jobs from reduced commercial business activity	Lost water utility revenues
2010	$96.95	$26.40	$3.57	813	$78.89
2020	$312.58	$364.24	$40.51	8,583	$349.72
2030	$847.63	$1,297.19	$143.13	30,419	$535.20
2040	$1,581.98	$1,439.98	$162.99	34,850	$618.95
2050	$2,948.37	$2,089.60	$226.17	48,039	$726.54
2060	$4,810.50	$2,520.56	$272.38	57,821	$905.55

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.4 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in Brazoria, Chambers, Fort Bend, Harris, Leon, Liberty, Madison, Montgomery, San Jacinto, Walker, and Waller. The Region H planning group estimates that these manufacturers would be short nearly 75,000 acre-feet of water in 2010 and 253,000 acre-feet in 2060. Shortages of these magnitudes would reduce gross state product (income plus taxes) by an estimated $2,939 million in 2010 and $12,199 million in 2060 (Table 11).

Table 11: Economic Impacts of Water Shortages for Manufacturing Water User Groups ($millions)			
Decade	**Lost income due to reduced manufacturing output**	**Lost state and local business tax revenues due to reduced manufacturing output**	**Lost jobs due to reduced manufacturing output**
2010	$2,732.37	$263.52	16,765
2020	$4,049.18	$388.78	25,236
2030	$7,425.93	$701.18	46,038
2040	$8,772.39	$831.23	54,765
2050	$9,992.81	$946.84	62,577
2060	$11,240.68	$1,076.53	71,341

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.5 Impacts of Mining Water Shortages

Ming water shortages in the region are projected to occur in Harris, Liberty, Montgomery and Polk counties, and would primarily affect the oil and gas and aggregates operations. In total, shortages would reduce gross state product by $35 million in 2010 and $233 million in 2060 (Table 12).

Table 12: Economic Impacts of Water Shortages for Mining Water User Groups ($millions)			
Decade	**Lost income due to reduced mining output**	**Lost state and local business tax revenues due to reduced mining output**	**Lost jobs due to reduced mining output**
2010	$35.39	$3.42	619
2020	$61.78	$5.94	1,048
2030	$84.50	$8.15	1,390
2040	$101.86	$9.79	1,659
2050	$204.68	$19.78	3,472
2060	$233.81	$22.46	3,916

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.6 Impacts of Steam-electric Water Shortages

Water shortages for steam-electric water user groups are projected to occur in Fort Bend, Galveston, Harris, Liberty, and Montgomery counties, and would reduce gross state product by $380 million dollars in 2010, and $5,238 million 2060 (Table 13).

Table 13: Economic Impacts of Water Shortages for Steam-electric Water User Groups ($millions)

Decade	Lost income due to reduced electrical generation	Lost state and local business tax revenues due to reduced electrical generation	Lost jobs due to reduced electrical generation
2010	$332.33	$47.70	1,130
2020	$650.93	$93.43	2,213
2030	$1,144.78	$164.32	3,892
2040	$2,537.55	$364.23	8,626
2050	$3,411.75	$489.70	11,598
2060	$4,580.79	$657.50	15,572

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to Gross Domestic Product measured at the state rather than national level.

2.7 Social Impacts of Water Shortages

As discussed previously, estimated social impacts focus on changes in population and school enrollment. In 2010, estimated population losses total 24,433 with corresponding reductions in school enrollment of 6,891 students (Table 14). In 2060, population in the region would decline by 175,389 people and school enrollment would fall by 32,522 students.

Table 14: Social Impacts of Water Shortages (2010-2060)

Year	Population Losses	Declines in School Enrollment
2010	24,433	6,891
2020	45,514	12,913
2030	99,071	26,242
2040	122,686	22,674
2050	152,028	28,078
2060	175,839	32,522

2.8 Distribution of Impacts by Major River Basin

Administrative rules require that impacts are presented by both planning region and major river basin. To meet rule requirements, impacts were allocated among basins based on the distribution of water shortages in relevant basins. For example, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin B, then impacts were split equally among the two basins. Table 15 displays the results.

Table 15: Distribution of Impacts by Major River Basin (2010-2060)

Water Use	2010	2020	2030	2040	2050	2060
Irrigation						
Brazos	2%	1%	1%	1%	1%	1%
Brazos-Colorado	1%	1%	1%	1%	1%	1%
Neches	1%	1%	1%	1%	1%	1%
San Jacinto	0%	<1%	0%	<1%	1%	2%
San Jacinto-Brazos	72%	70%	68%	67%	65%	63%
Trinity	18%	19%	21%	23%	24%	24%
Trinity-San Jacinto	7%	8%	8%	8%	8%	8%
Manufacturing						
Brazos	52%	61%	60%	60%	60%	63%
Brazos-Colorado	0%	<1%	<1%	<1%	<1%	<1%
San Jacinto	1%	1%	2%	2%	2%	2%
San Jacinto-Brazos	6%	8%	12%	14%	15%	14%
Trinity	0%	1%	1%	1%	1%	1%
Trinity-San Jacinto	42%	29%	26%	24%	23%	20%
Mining						
Brazos	0%	3%	4%	3%	3%	3%
Brazos-Colorado	0%	5%	5%	6%	6%	6%
Neches Trinity	2%	2%	2%	2%	2%	2%
San Jacinto	4%	5%	6%	6%	6%	6%
San Jacinto-Brazos	<1%	2%	6%	6%	6%	5%
Trinity	72%	64%	59%	60%	59%	59%
Trinity-San Jacinto	21%	19%	17%	18%	19%	19%
Municipal						
Brazos	<1%	2%	4%	6%	7%	8%
Brazos-Colorado	4%	1%	1%	1%	1%	<1%
Colorado	0%	<1%	<1%	<1%	<1%	<1%
Neches	0%	<1%	<1%	<1%	<1%	<1%
Neches-Trinity	<1%	<1%	<1%	<1%	<1%	<1%
San Jacinto	71%	85%	81%	77%	74%	73%
San Jacinto-Brazos	23%	10%	13%	15%	17%	17%
Trinity	2%	1%	1%	1%	1%	1%
Trinity-San Jacinto	<1%	<1%	<1%	<1%	<1%	<1%

Table continued on following page.

Table 15: Distribution of Impacts by Major River Basin (continued from previous page)						
Water Use	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Steam-electric power						
Brazos	88%	14%	14%	13%	12%	10%
San Jacinto-Brazos	12%	11%	9%	7%	6%	5%
San Jacinto	0%	65%	67%	68%	70%	61%
Trinity	0%	10%	11%	12%	11%	9%

Appendix 1: Economic Data for Individual IMPLAN Sectors

Economic Data for Agricultural Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Irrigation	Rice milling	49	$351.85	$2.69	$349.15	577	$45.17	$2.78
Irrigation	Rice ("all other crop farming")	10	$49.16	$43.55	$5.61	389	$24.06	$0.95
Irrigation	Fruit farming	5	$4.10	0.87	3.23	92	$2.33	$0.09
Irrigation	Vegetable and melon farming	3	$1.28	0.05	1.23	21	$0.94	$0.01
Irrigation	Tree nut farming	4	$1.03	0.05	0.98	16	$0.72	$0.03
Irrigation	Grain farming	6	$0.99	0.25	0.74	43	$0.46	$0.02
Irrigation	Total irrigation	NA	$56.56	$44.77	$11.79	561	$28.51	$1.10
Irrigation	Non-irrigated crops	various	$342.84	$90.91	$251.93	7,723	$239.52	$65.69
Irrigation	Total crop production	NA	$455.97	$180.46	$275.51	8,845	$296.53	$67.89
Livestock	Meat processed from carcasses	68	$646.65	$190.77	$455.88	1,473	$71.87	$3.77
Livestock	Cattle ranching and farming	11	$408.82	$283.48	$125.35	9,382	$32.30	$8.60
Livestock	Fluid milk manufacturing	62	$330.75	$79.57	$251.18	576	$27.71	$1.69
Livestock	Cheese manufacturing	64	$174.09	$72.10	$101.99	236	$12.04	$1.09
Livestock	Poultry and egg production	12	$78.31	$61.37	$16.94	453	$26.39	$0.27
Livestock	Animal- except poultry- slaughtering	67	$57.66	$15.42	$42.25	139	$9.83	$0.39
Livestock	Animal production- except cattle and poultry	13	$53.43	$45.31	$8.13	2,622	$5.19	$0.83
Livestock	Poultry processing	70	$40.62	$12.93	$27.70	123	$16.62	$0.44
Livestock	Rendering and meat byproduct processing	69	$21.32	$11.83	$9.49	28	$8.82	$0.23
Livestock	Creamery butter manufacturing	63	$0.56	$0.06	$0.50	1	$0.23	$0.001
Total livestock		NA	$1,812.22	$772.84	$1,039.38	15,033	$210.98	$17.29

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Mining and Steam-electric Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Mining	Oil and gas extraction	19	$71,360.84	$66,271.93	$5,088.91	80,231	$41,061.13	$4,313.45
Mining	Drilling oil and gas wells	27	$15,338.84	$76.56	$15,262.27	19,088	$5,682.63	$749.02
Mining	Support activities for oil and gas operations	28	$7,764.77	$1,078.50	$6,686.27	19,751	$7,042.02	$316.89
Mining	Natural gas distribution	31	$5,774.59	$2,314.45	$3,460.14	3,524	$2,105.92	$873.61
Mining	Coal mining	20	$170.63	$63.94	$106.69	440	$66.31	$20.40
Mining	Sand- gravel- clay- and refractory mining	25	$143.01	$15.09	$127.92	719	$84.81	$4.14
Mining	Other nonmetallic mineral mining	26	$89.78	$8.98	$80.80	351	$44.69	$2.51
Mining	Support activities for other mining	29	$13.64	$0.20	$13.44	17	$9.69	$0.08
Mining	Gold- silver- and other metal ore mining	23	$10.48	$5.85	$4.63	30	$4.44	$0.36
Mining	Stone mining and quarrying	24	$3.20	$0.33	$2.87	10	$1.89	$0.02
Mining	Copper- nickel- lead- and zinc mining	22	$1.36	$1.26	$0.10	4	$0.65	$0.07
	Total mining		$100,671.55	$69,837.10	$30,834.44	124,166	$56,104.32	$6,280.56
Steam-electric	Power generation and supply	30	$25,548.42	$7,187.34	$18,361.09	12,412	$17,800.89	$2,967.22

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Manufacturing Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Manufacturing	Petrochemical manufacturing	147	$130,689.99	$59,878.02	$70,811.97	16,007	$15,106.03	$858.08
Manufacturing	Petroleum refineries	142	$111,335.06	$41,383.30	$69,951.75	11,584	$16,861.18	$645.91
Manufacturing	Electronic computer manufacturing	302	$17,825.77	$4,149.41	$13,676.36	7,073	$1,215.14	$95.08
Manufacturing	New residential 1-unit structures- all	33	$14,072.59	$0.02	$14,072.57	86,401	$5,311.90	$83.61
Manufacturing	Oil and gas field machinery and equipment	261	$9,925.65	$369.64	$9,556.01	24,970	$3,065.70	$62.70
Manufacturing	Commercial and institutional buildings	38	$8,348.60	$0.00	$8,348.59	75,325	$4,552.64	$56.09
Manufacturing	Other basic organic chemical manufacturing	151	$7,337.98	$1,368.11	$5,969.86	5,934	$1,492.89	$60.26
Manufacturing	Plastics material and resin manufacturing	152	$7,252.15	$287.19	$6,964.96	4,644	$1,755.50	$56.96
Manufacturing	Other new construction	41	$3,676.19	$0.01	$3,676.20	34,557	$2,111.29	$16.61
Manufacturing	Pesticide and other agricultural chemical man	159	$2,696.36	$451.80	$2,244.56	1,361	$1,020.88	$17.86
Manufacturing	New residential additions and alterations-all	35	$2,040.72	$0.02	$2,040.70	10,284	$842.21	$11.88
Manufacturing	Industrial gas manufacturing	148	$1,899.82	$998.97	$900.84	1,682	$809.22	$12.23
Manufacturing	Metal valve manufacturing	248	$1,852.57	$200.63	$1,651.95	5,927	$892.57	$11.56
Manufacturing	Highway- street- bridge- and tunnel construct	39	$1,800.58	$0.00	$1,800.59	14,585	$975.02	$12.42
Manufacturing	Other miscellaneous chemical product manufacturing	171	$1,657.38	$867.12	$790.26	2,996	$512.28	$13.09
Manufacturing	New multifamily housing structures- all	34	$1,606.21	$0.00	$1,606.20	12,556	$819.77	$4.74
Manufacturing	Automobile and light truck manufacturing	344	$1,588.93	$1.70	$1,587.23	1,130	$141.73	$4.59
Manufacturing	Guided missile and space vehicle manufacturing	354	$1,543.80	$75.00	$1,468.80	3,564	$534.45	$6.38
Manufacturing	Pharmaceutical and medicine manufacturing	160	$1,451.15	$265.20	$1,185.95	1,700	$355.77	$8.11
Manufacturing	Water- sewer- and pipeline construction	40	$1,285.08	$0.01	$1,285.10	9,543	$625.45	$9.03
Manufacturing	Soft drink and ice manufacturing	85	$1,251.40	$69.90	$1,181.50	1,836	$253.95	$11.25
Manufacturing	Other basic inorganic chemical manufacturing	150	$1,230.88	$271.19	$959.69	1,873	$493.21	$5.39
Manufacturing	Plate work manufacturing	234	$1,173.25	$73.85	$1,099.40	4,225	$516.20	$6.72
Manufacturing	Plastics pipe- fittings- and profile shapes	173	$1,114.96	$685.80	$429.16	2,673	$397.37	$9.02
Manufacturing	Machine shops	243	$1,103.43	$266.31	$837.12	7,136	$567.99	$9.09
Manufacturing	Paint and coating manufacturing	161	$1,079.49	$13.73	$1,065.76	1,683	$256.74	$6.18
Manufacturing	Semiconductors and related device manufacturing	311	$1,035.36	$551.05	$484.31	1,142	$225.39	$6.37
Manufacturing	Fabricated pipe and pipe fitting manufacturing	252	$1,032.18	$116.61	$915.57	4,508	$444.76	$6.14
Manufacturing	All other manufacturing		$38,380.24	$8,609.73	$29,770.51	136,627	$13,443.08	$419.66
Manufacturing	Total manufacturing		$377,287.75	$120,954.26	$256,333.49	493526	$75,600.29	$2,527.00

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Municipal Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Municipal	Wholesale trade	390	$33,539.00	$16,057.24	$17,481.76	160,611	$17,653.96	$4,964.22
Municipal	Real estate	431	$25,137.80	$9,950.90	$15,186.91	121,747	$14,545.48	$3,095.94
Municipal	Owner-occupied dwellings	509	$21,656.85	-$0.01	$21,656.86	0	$16,776.87	$2,560.80
Municipal	Architectural and engineering services	439	$14,855.13	$9,364.16	$5,490.97	106,669	$8,524.77	$70.68
Municipal	State & Local Education	503	$11,107.95	$0.01	$11,107.94	236,560	$11,107.95	$0.00
Municipal	Food services and drinking places	481	$9,823.10	$1,254.40	$8,568.71	185,919	$4,340.10	$507.03
Municipal	Pipeline transportation	396	$9,578.11	$4,188.82	$5,389.29	6,791	$3,971.45	$849.62
Municipal	Monetary authorities and depository credit in	430	$9,078.09	$2,989.90	$6,088.19	33,849	$6,374.76	$116.14
Municipal	Offices of physicians- dentists- and other he	465	$8,010.08	$0.00	$8,010.08	64,239	$5,711.95	$50.07
Municipal	Hospitals	467	$7,955.92	$0.00	$7,955.92	65,074	$4,408.69	$56.20
Municipal	Telecommunications	422	$6,823.45	$2,343.73	$4,479.72	18,481	$2,848.73	$474.82
Municipal	Legal services	437	$6,720.69	$4,265.34	$2,455.35	43,458	$4,334.35	$134.97
Municipal	Air transportation	391	$5,966.11	$664.50	$5,301.61	24,528	$2,034.40	$256.18
Municipal	Truck transportation	394	$5,714.00	$3,093.97	$2,620.04	49,614	$2,346.61	$53.82
Municipal	Insurance carriers	427	$5,645.46	$1,646.20	$3,999.26	22,867	$1,994.24	$247.20
Municipal	State & Local Non-Education	504	$5,631.04	$0.00	$5,631.05	81,782	$5,631.04	$0.00
Municipal	Office administrative services	452	$5,538.55	$2,463.92	$3,074.63	22,568	$3,263.33	$56.26
Municipal	Motor vehicle and parts dealers	401	$5,042.54	$548.32	$4,494.22	41,078	$2,626.84	$743.26
Municipal	Cable networks and program distribution	421	$4,748.61	$1,127.36	$3,621.25	5,132	$1,587.48	$87.12
Municipal	All other miscellaneous professional and tech	450	$4,657.77	$4,158.57	$499.20	8,112	$1,884.06	$37.77
Municipal	Management of companies and enterprises	451	$4,541.85	$4,271.19	$270.66	27,749	$2,386.75	$38.10
Municipal	Securities- commodity contracts- investments	426	$4,341.56	$2,883.19	$1,458.36	25,729	$2,234.36	$65.37
Municipal	Management consulting services	444	$4,224.70	$3,252.06	$972.64	29,572	$2,251.86	$17.49
Municipal	Scenic and sightseeing transportation and sup	397	$3,844.57	$1,442.33	$2,402.24	26,914	$2,610.03	$443.86
Municipal	Insurance agencies and brokerages	428	$3,642.87	$2,137.73	$1,505.14	24,528	$3,089.52	$19.51
Municipal	All other municipal	NA	$105,907.43	$38,161.04	$67,746.39	1,306,737	$58,017.46	$4,122.92
Municipal	Total municipal	NA	$333,733.23	$116,264.88	$217,468.36	2,740,308	$192,557.01	$19,069.36

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Appendix 2: Impacts by Water User Group

Irrigation ($millions)						
	2010	2020	2030	2040	2050	2060
Brazoria County						
Reduced income from curtailed rice production and milling activity	$57.80	$51.41	$48.95	$47.48	$47.48	$47.48
Reduced business taxes from curtailed rice production and milling activity	$6.69	$5.95	$5.67	$5.50	$5.50	$5.50
Reduced jobs from curtailed rice production and milling activity	762	678	646	626	626	626
Chambers County						
Reduced income from curtailed rice production and milling activity	$3.79	$3.82	$3.84	$3.85	$3.87	$3.88
Reduced business taxes from curtailed rice production and milling activity	$0.44	$0.44	$0.44	$0.45	$0.45	$0.45
Reduced jobs from curtailed rice production and milling activity	0	0	0	0	0	0
Galveston County						
Reduced income from curtailed rice production and milling activity	$5.14	$5.14	$5.14	$5.14	$5.14	$5.14
Reduced business taxes from curtailed rice production and milling activity	$0.59	$0.59	$0.59	$0.59	$0.59	$0.59
Reduced jobs from curtailed rice production and milling activity	68	68	68	68	68	68
Liberty County						
Reduced income from curtailed rice production and milling activity	$1.46	$1.74	$1.95	$2.18	$2.45	$2.75
Reduced business taxes from curtailed rice production and milling activity	$0.17	$0.20	$0.23	$0.25	$0.28	$0.32
Reduced jobs from curtailed rice production and milling activity	19	23	26	29	32	36
Waller County						
Reduced income from curtailed rice production and milling activity	$0.00	$0.27	$0.00	$0.01	$0.89	$1.90
Reduced business taxes from curtailed rice production and milling activity	$0.00	$0.03	$0.00	$0.00	$0.10	$0.22
Reduced jobs from curtailed rice production and milling activity	0	0	0	0	0	0

Manufacturing ($millions)						
	2010	2020	2030	2040	2050	2060
Austin County						
Reduced income from reduced manufacturing output	$0.00	$11.86	$22.17	$31.96	$40.21	$106.20
Reduced business taxes from reduced manufacturing output	$0.00	$1.07	$2.00	$2.89	$3.63	$9.59
Reduced jobs from reduced manufacturing output	0	139	260	375	472	1,246
Brazoria County						
Reduced income from reduced manufacturing output	$700.34	$1,470.14	$3,790.98	$4,648.20	$5,408.39	$6,327.48
Reduced business taxes from reduced manufacturing output	$74.51	$156.40	$403.31	$494.51	$575.38	$673.16
Reduced jobs from reduced manufacturing output	4,548	9,546	24,616	30,183	35,119	41,087
Chambers County						
Reduced income from reduced manufacturing output	$1,705.29	$1,944.04	$2,156.17	$2,367.47	$2,557.52	$2,803.08
Reduced business taxes from reduced manufacturing output	$162.69	$185.46	$205.70	$225.86	$243.99	$267.42
Reduced jobs from reduced manufacturing output	9,989	11,388	12,630	13,868	14,981	16,420
Fort Bend County						
Reduced income from reduced manufacturing output	$0.00	$74.25	$593.24	$635.04	$662.78	$583.42
Reduced business taxes from reduced manufacturing output	$0.00	$2.98	$23.83	$25.51	$26.63	$23.44
Reduced jobs from reduced manufacturing output	0	242	1,935	2,071	2,162	1,903
Harris County						
Reduced income from reduced manufacturing output	$301.80	$413.05	$507.94	$591.82	$654.59	$623.10
Reduced business taxes from reduced manufacturing output	$24.43	$33.44	$41.12	$47.91	$52.99	$50.44
Reduced jobs from reduced manufacturing output	1,978	2,707	3,329	3,879	4,290	4,084
Leon County						
Reduced income from reduced manufacturing output	$0.00	$10.18	$20.12	$60.27	$78.40	$95.25
Reduced business taxes from reduced manufacturing output	$0.00	$0.62	$1.22	$3.66	$4.76	$5.78
Reduced jobs from reduced manufacturing output	0	51	101	304	395	480
Liberty County						
Reduced income from reduced manufacturing output	$0.00	$13.93	$27.86	$42.18	$110.29	$132.73
Reduced business taxes from reduced manufacturing output	$0.00	$0.45	$0.91	$1.37	$3.59	$4.32
Reduced jobs from reduced manufacturing output	0	45	91	138	360	433

Manufacturing (cont.)

	2010	2020	2030	2040	2050	2060
Madison County						
Reduced income from reduced manufacturing activity	$0.00	$0.52	$1.00	$1.48	$1.91	$4.93
Reduced business taxes from reduced manufacturing activity	$0.00	$0.02	$0.04	$0.07	$0.09	$0.22
Reduced jobs from reduced manufacturing activity	0	6	12	18	23	59
Montgomery County						
Reduced income from reduced manufacturing activity	$24.95	$105.12	$294.50	$373.66	$453.03	$532.83
Reduced business taxes from reduced manufacturing activity	$1.90	$8.00	$22.42	$28.44	$34.48	$40.56
Reduced jobs from reduced manufacturing activity	250	1,054	2,952	3,745	4,541	5,341
San Jacinto County						
Reduced income from reduced manufacturing activity	$0.00	$0.04	$0.08	$0.12	$0.15	$0.20
Reduced business taxes from reduced manufacturing activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Reduced jobs from reduced manufacturing activity	0	0	0	1	1	1
Walker Bend County						
Reduced income from reduced manufacturing activity	$0.00	$1.42	$2.97	$7.03	$8.52	$10.17
Reduced business taxes from reduced manufacturing activity	$0.00	$0.05	$0.10	$0.23	$0.28	$0.34
Reduced jobs from reduced manufacturing activity	0	11	24	56	68	82
Waller County						
Reduced income from reduced manufacturing activity	$0.00	$4.64	$8.90	$13.16	$17.03	$21.28
Reduced business taxes from reduced manufacturing activity	$0.00	$0.28	$0.53	$0.78	$1.01	$1.27
Reduced jobs from reduced manufacturing activity	0	45	87	128	166	207

Mining ($millions)						
	2010	2020	2030	2040	2050	2060
Harris County						
Reduced income from reduced mining activity	$0.68	$1.41	$1.86	$4.63	$5.55	$6.36
Reduced business taxes from reduced mining activity	$0.05	$0.11	$0.14	$0.35	$0.41	$0.47
Reduced jobs from reduced mining activity	4	9	11	28	34	39
Liberty County						
Reduced income from reduced mining activity	$0.00	$1.23	$2.28	$3.25	$4.35	$5.51
Reduced business taxes from reduced mining activity	$0.00	$0.16	$0.30	$0.43	$0.58	$0.74
Reduced jobs from reduced mining activity	0	45	83	118	159	201
Montgomery County						
Reduced income from reduced mining activity	$0.65	$2.55	$6.59	$7.82	$9.03	$10.04
Reduced business taxes from reduced mining activity	$0.06	$0.25	$0.64	$0.76	$0.87	$0.97
Reduced jobs from reduced mining activity	11	22	29	34	40	44
Polk County						
Reduced income from reduced mining activity	$0.00	$0.001	$0.002	$0.002	$0.003	$0.003
Reduced business taxes from reduced mining activity	$0.00	$0.0001	$0.0001	$0.0001	$0.0002	$0.0002
Reduced jobs from reduced mining activity	0	0	0	0	0	0

Steam-electric ($millions)						
	2010	2020	2030	2040	2050	2060
Fort Bend County						
Reduced income from reduced electrical generation	$0.00	$0.00	$0.00	$0.00	$0.00	$103.48
Reduced business taxes from reduced electrical generation	$0.00	$0.00	$0.00	$0.00	$0.00	$14.85
Reduced jobs from reduced electrical generation	0	0	0	0	0	352
Galveston County						
Reduced income from reduced electrical generation	$321.83	$102.30	$282.56	$377.52	$493.37	$634.48
Reduced business taxes from reduced electrical generation	$46.19	$14.68	$40.56	$54.19	$70.82	$91.07
Reduced jobs from reduced electrical generation	1,094	348	961	1,283	1,677	2,157
Harris County						
Reduced income from reduced electrical generation	$10.49	$501.07	$713.74	$1,945.92	$2,577.91	$3,348.21
Reduced business taxes from reduced electrical generation	$1.51	$71.92	$102.45	$279.31	$370.02	$480.58
Reduced jobs from reduced electrical generation	36	1,703	2,426	6,615	8,763	11,382
Liberty County						
Reduced income from reduced electrical generation	$0.00	$47.56	$148.48	$213.53	$292.79	$389.47
Reduced business taxes from reduced electrical generation	$0.00	$6.83	$21.31	$30.65	$42.03	$55.90
Reduced jobs from reduced electrical generation	0	162	505	726	995	1,324
Montgomery County						
Reduced income from reduced electrical generation	$0.00	$0.00	$0.00	$0.59	$47.69	$105.16
Reduced business taxes from reduced electrical generation	$0.00	$0.00	$0.00	$0.08	$6.85	$15.09
Reduced jobs from reduced electrical generation	0	0	0	2	162	357

Municipal ($millions)

	2010	2020	2030	2040	2050	2060
Alvin						
Monetary value of domestic water shortages	$0.00	$0.16	$0.32	$0.44	$0.80	$1.09
Lost utility revenues	$0.00	$0.31	$0.58	$0.79	$1.14	$1.55
Ames						
Monetary value of domestic water shortages	$0.00	$0.03	$0.07	$0.12	$0.76	$1.12
Lost utility revenues	$0.00	$0.04	$0.08	$0.12	$0.17	$0.22
Angleton						
Monetary value of domestic water shortages	$0.32	$0.33	$0.35	$0.35	$0.42	$0.58
Lost utility revenues	$0.51	$0.52	$0.55	$0.57	$0.67	$0.83
Arcola						
Monetary value of domestic water shortages	$0.00	$1.17	$4.90	$5.56	$6.43	$8.83
Lost income from reduced commercial business activity	$0.00	$0.00	$0.12	$0.15	$0.19	$0.24
Lost jobs due to reduced commercial business activity	0	0	5	6	8	10
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.02	$0.03	$0.04
Lost utility revenues	$0.00	$0.26	$0.56	$0.64	$0.74	$0.86
Bailey's Prairie						
Monetary value of domestic water shortages	$0.00	$0.01	$0.07	$0.13	$0.23	$0.02
Lost utility revenues	$0.00	$0.01	$0.01	$0.02	$0.02	$0.03
Beach City						
Monetary value of domestic water shortages	$3.82	$7.01	$8.99	$10.87	$12.77	$14.64
Lost income from reduced commercial business activity	$0.26	$0.41	$0.55	$0.67	$0.80	$0.93
Lost jobs due to reduced commercial business activity	10	17	22	27	32	38
Lost state and local taxes from reduced commercial business activity	$0.04	$0.06	$0.09	$0.10	$0.12	$0.14
Lost utility revenues	$0.45	$0.64	$0.82	$0.97	$1.13	$1.30
Beasley						
Monetary value of domestic water shortages	$0.00	$0.01	$0.04	$0.09	$0.58	$0.99
Lost utility revenues	$0.00	$0.02	$0.05	$0.08	$0.13	$0.18

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Bellaire						
Monetary value of domestic water shortages	$0.35	$7.38	$8.64	$8.50	$8.41	$8.41
Lost income from reduced commercial business activity	$0.00	$2.60	$3.21	$3.16	$3.12	$3.12
Lost jobs due to reduced commercial business activity	0	82	101	100	98	98
Lost state and local taxes from reduced commercial business activity	$0.00	$0.37	$0.46	$0.45	$0.45	$0.45
Lost utility revenues	$3.07	$3.55	$4.02	$4.52	$5.05	$5.63
Belleville						
Monetary value of domestic water shortages	$0.00	$0.37	$0.77	$0.92	$3.27	$4.02
Lost utility revenues	$0.00	$0.52	$0.86	$1.04	$1.13	$1.28
Blue Manor Utility Co.						
Monetary value of domestic water shortages	$0.35	$7.38	$8.64	$8.50	$8.41	$8.41
Lost income from reduced commercial business activity	$0.00	$2.60	$3.21	$3.16	$3.12	$3.12
Lost jobs due to reduced commercial business activity	0	82	101	100	98	98
Lost state and local taxes from reduced commercial business activity	$0.00	$0.37	$0.46	$0.45	$0.45	$0.45
Lost utility revenues	$0.34	$0.78	$0.88	$0.87	$0.86	$0.86
Brazoria MUD #1						
Monetary value of domestic water shortages	$0.00	$4.08	$16.92	$16.17	$25.56	$33.73
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$2.87	$4.32	$11.70
Lost jobs due to reduced commercial business activity	0	0	0	90	136	369
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.41	$0.62	$1.67
Lost utility revenues	$0.00	$0.68	$1.36	$1.96	$2.62	$3.31
Brazoria MUD #2						
Monetary value of domestic water shortages	$0.00	$3.34	$13.70	$13.21	$17.36	$26.05
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$3.52	$5.33	$14.44
Lost jobs due to reduced commercial business activity	0	0	0	111	168	455
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.50	$0.76	$2.06
Lost utility revenues	$0.00	$0.94	$1.85	$2.67	$3.55	$4.48

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Brazoria MUD #3						
Monetary value of domestic water shortages	$0.00	$2.95	$6.46	$11.72	$18.38	$22.79
Lost income from reduced commercial business activity	$0.00	$0.00	$0.56	$2.07	$3.12	$8.43
Lost jobs due to reduced commercial business activity	0	0	18	65	98	266
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.29	$0.44	$1.20
Lost utility revenues	$0.00	$0.53	$1.06	$1.52	$2.04	$2.57
Britmoore Utility						
Monetary value of domestic water shortages	$1.55	$7.15	$9.75	$11.74	$13.47	$15.10
Lost income from reduced commercial business activity	$0.00	$2.54	$3.62	$4.26	$4.89	$5.55
Lost jobs due to reduced commercial business activity	0	80	114	134	154	175
Lost state and local taxes from reduced commercial business activity	$0.00	$0.36	$0.52	$0.61	$0.70	$0.79
Lost utility revenues	$0.28	$0.76	$0.99	$1.15	$1.30	$1.46
Brookshire						
Monetary value of domestic water shortages	$0.00	$1.44	$5.09	$13.19	$12.89	$20.70
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$2.25	$3.52
Lost jobs due to reduced commercial business activity	0	0	0	0	71	111
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.32	$0.50
Lost utility revenues	$0.00	$0.34	$0.72	$1.15	$1.67	$2.30
Brookside Village						
Monetary value of domestic water shortages	$0.00	$0.04	$0.09	$0.15	$0.23	$1.21
Lost utility revenues	$0.00	$0.06	$0.11	$0.16	$0.22	$0.29
Buffalo						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.06	$0.05	$0.06
Lost utility revenues	$0.00	$0.07	$0.10	$0.10	$0.09	$0.09
Bunker Village						
Monetary value of domestic water shortages	$0.90	$1.14	$4.52	$4.44	$4.42	$4.42
Lost utility revenues	$1.12	$1.10	$1.09	$1.07	$1.06	$1.06

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Candlelight Hills Sub.						
Monetary value of domestic water shortages	$1.48	$7.01	$9.49	$11.03	$12.52	$14.09
Lost income from reduced commercial business activity	$0.00	$0.94	$1.36	$1.61	$1.86	$2.11
Lost jobs due to reduced commercial business activity	0	38	55	65	75	85
Lost state and local taxes from reduced commercial business activity	$0.00	$0.15	$0.21	$0.25	$0.29	$0.33
Lost utility revenues	$0.27	$0.73	$0.97	$1.13	$1.28	$1.45
Centerville						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.03	$0.04	$0.04	$0.03	$0.03
Central Harris Co. Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$4.33	$27.43	$27.43	$27.43	$27.43
Lost utility revenues	$0.00	$3.90	$5.08	$5.08	$5.08	$5.08
Chimney Hill MUD						
Monetary value of domestic water shortages	$0.00	$0.03	$0.09	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.05	$0.14	$0.12	$0.12	$0.12
Clear Lake Shores						
Monetary value of domestic water shortages	$0.82	$0.86	$0.88	$0.86	$0.86	$0.96
Lost utility revenues	$0.20	$0.21	$0.21	$0.21	$0.21	$0.21
Cleveland						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.07	$0.13	$0.19
Lost utility revenues	$0.00	$0.04	$0.09	$0.14	$0.23	$0.34
Clute						
Monetary value of domestic water shortages	$0.03	$0.06	$0.12	$0.15	$0.23	$0.36
Lost utility revenues	$0.06	$0.12	$0.22	$0.26	$0.37	$0.51
Coldspring						
Monetary value of domestic water shortages	$0.00	$0.04	$0.09	$0.12	$0.15	$0.16
Lost utility revenues	$0.00	$0.06	$0.11	$0.13	$0.15	$0.16

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Conroe						
Monetary value of domestic water shortages	$14.91	$74.86	$234.26	$199.42	$303.76	$423.28
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$102.70	$170.72
Lost jobs due to reduced commercial business activity	0	0	0	0	2,289	3,806
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$10.93	$18.17
Lost utility revenues	$4.73	$11.32	$17.88	$18.67	$30.19	$43.52
Consumers Water Inc.						
Monetary value of domestic water shortages	$1.78	$8.87	$12.63	$15.72	$20.45	$26.13
Lost income from reduced commercial business activity	$0.00	$0.93	$1.61	$2.06	$3.00	$3.75
Lost jobs due to reduced commercial business activity	0	38	65	83	121	151
Lost state and local taxes from reduced commercial business activity	$0.00	$0.14	$0.25	$0.32	$0.47	$0.58
Lost utility revenues	$0.34	$0.93	$1.35	$1.71	$2.15	$2.62
County-other (Austin)						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.05	$0.06	$0.07
County-other (Brazoria)						
Monetary value of domestic water shortages	$51.27	$60.68	$79.48	$100.95	$113.90	$128.36
County-other (Chambers)						
Monetary value of domestic water shortages	$6.07	$5.88	$5.71	$5.53	$5.39	$5.38
County-other (Fort Bend)						
Monetary value of domestic water shortages	$0.00	$0.35	$5.08	$19.74	$220.50	$646.50
County-other (Harris)						
Monetary value of domestic water shortages	$3.25	$0.00	$99.80	$405.59	$826.26	$1,270.87

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
County-other (Leon)						
Monetary value of domestic water shortages	$0.00	$0.06	$0.07	$0.03	$0.01	$0.02
County-other (Liberty)						
Monetary value of domestic water shortages	$0.00	$0.61	$1.52	$2.91	$12.96	$20.82
County-other (Madison)						
Monetary value of domestic water shortages	$0.00	$0.06	$0.12	$0.08	$0.11	$0.21
County-other (Montgomery)						
Monetary value of domestic water shortages	$9.42	$103.75	$255.07	$532.19	$950.21	$1,625.12
County-other (Polk)						
Monetary value of domestic water shortages	$0.00	$0.08	$0.15	$0.20	$0.32	$0.48
County-other (San Jacinto)						
Monetary value of domestic water shortages	$0.00	$0.11	$0.19	$0.26	$0.28	$0.34
County-other (Waller)						
Monetary value of domestic water shortages	$0.00	$0.24	$0.59	$1.14	$6.19	$10.52
Crosby MUD						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.01
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Crystal Springs Water Co.						
Monetary value of domestic water shortages	$1.26	$5.98	$8.23	$11.94	$22.06	$29.45
Lost income from reduced commercial business activity	$0.00	$0.00	$1.24	$2.20	$7.47	$11.06
Lost jobs due to reduced commercial business activity	0	0	39	69	236	349
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.18	$0.31	$1.07	$1.58
Lost utility revenues	$0.27	$0.59	$0.96	$1.42	$2.13	$2.95
Cut and Shoot						
Monetary value of domestic water shortages	$0.43	$1.86	$2.82	$2.80	$3.59	$6.02
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.24	$0.40
Lost jobs due to reduced commercial business activity	0	0	0	0	10	16
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.04	$0.06
Lost utility revenues	$0.10	$0.20	$0.30	$0.30	$0.47	$0.67
Daisetta						
Monetary value of domestic water shortages	$0.00	$0.00	$0.01	$0.01	$0.01	$0.02
Lost utility revenues	$0.00	$0.01	$0.01	$0.01	$0.02	$0.04
Danbury						
Monetary value of domestic water shortages	$0.00	$0.01	$0.02	$0.03	$0.05	$0.09
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.08	$0.11
Dayton						
Monetary value of domestic water shortages	$0.00	$0.69	$6.43	$0.00	$0.00	$20.74
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$12.62
Lost jobs due to reduced commercial business activity	0	0	0	0	0	281
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.34
Lost utility revenues	$0.00	$0.78	$1.49	$2.17	$2.96	$3.88
Deer Park						
Monetary value of domestic water shortages	$0.00	$0.00	$0.03	$0.04	$0.13	$0.27
Lost utility revenues	$0.00	$0.00	$0.05	$0.08	$0.22	$0.46

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Dickinson						
Monetary value of domestic water shortages	$1.08	$2.07	$9.79	$10.07	$10.38	$10.73
Lost utility revenues	$1.25	$1.86	$2.17	$2.23	$2.30	$2.38
East Plantation UD						
Monetary value of domestic water shortages	$0.97	$4.40	$7.24	$7.86	$10.79	$19.08
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.77	$2.65
Lost jobs due to reduced commercial business activity	0	0	0	0	31	106
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.12	$0.41
Lost utility revenues	$0.21	$0.46	$0.76	$0.83	$1.43	$2.12
El Dorado UD						
Monetary value of domestic water shortages	$1.52	$6.70	$8.46	$9.22	$10.03	$10.94
Lost income from reduced commercial business activity	$0.00	$0.90	$1.21	$1.33	$1.47	$1.62
Lost jobs due to reduced commercial business activity	0	36	49	54	59	65
Lost state and local taxes from reduced commercial business activity	$0.00	$0.14	$0.19	$0.21	$0.23	$0.25
Lost utility revenues	$0.28	$0.70	$0.86	$0.94	$1.03	$1.12
EL Lago						
Monetary value of domestic water shortages	$4.02	$4.53	$4.69	$4.82	$4.89	$6.30
Lost income from reduced commercial business activity	$0.26	$0.32	$0.35	$0.37	$0.39	$0.42
Lost jobs due to reduced commercial business activity	11	13	14	15	16	17
Lost state and local taxes from reduced commercial business activity	$0.04	$0.05	$0.05	$0.06	$0.06	$0.06
Lost utility revenues	$0.55	$0.59	$0.62	$0.63	$0.65	$0.67
Fairchilds						
Monetary value of domestic water shortages	$0.00	$1.39	$6.73	$9.00	$15.27	$19.78
Lost income from reduced commercial business activity	$0.00	$0.00	$0.17	$0.28	$0.84	$1.17
Lost jobs due to reduced commercial business activity	0	0	7	11	34	47
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.03	$0.04	$0.13	$0.18
Lost utility revenues	$0.00	$0.30	$0.77	$1.04	$1.41	$1.83

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
First Colony MUD #9						
Monetary value of domestic water shortages	$0.00	$0.69	$10.05	$10.40	$10.99	$11.53
Lost income from reduced commercial business activity	$0.00	$0.00	$0.38	$0.41	$0.45	$0.49
Lost jobs due to reduced commercial business activity	0	0	15	17	18	20
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.06	$0.07	$0.08
Lost utility revenues	$0.00	$0.78	$1.61	$1.69	$1.78	$1.87
Flo Community WSC						
Monetary value of domestic water shortages	$0.00	$0.17	$0.33	$0.22	$0.20	$0.21
Lost utility revenues	$0.00	$0.20	$0.29	$0.29	$0.26	$0.27
Fort Bend County MUD #106						
Monetary value of domestic water shortages	$0.00	$0.17	$0.33	$0.22	$0.20	$0.21
Lost income from reduced commercial business activity	$0.00	$0.00	$0.25	$0.25	$0.25	$0.25
Lost jobs due to reduced commercial business activity	0	0	10	10	10	10
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.04	$0.04	$0.04
Lost utility revenues	$0.00	$0.57	$1.14	$1.14	$1.14	$1.14
Fort Bend County MUD #108						
Monetary value of domestic water shortages	$0.00	$1.43	$5.08	$5.07	$5.07	$5.07
Lost income from reduced commercial business activity	$0.00	$0.00	$0.15	$0.15	$0.15	$0.15
Lost jobs due to reduced commercial business activity	0	0	6	6	6	6
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.34	$0.68	$0.68	$0.68	$0.68
Fort Bend County MUD #23						
Monetary value of domestic water shortages	$0.00	$4.26	$12.47	$12.47	$12.48	$12.48
Lost income from reduced commercial business activity	$0.00	$0.00	$1.35	$1.35	$1.35	$1.35
Lost jobs due to reduced commercial business activity	0	0	54	54	54	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.21	$0.21	$0.21	$0.21
Lost utility revenues	$0.00	$1.11	$2.22	$2.22	$2.22	$2.22

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Fort Bend County MUD #25						
Monetary value of domestic water shortages	$0.00	$4.70	$17.59	$29.86	$65.65	$88.26
Lost income from reduced commercial business activity	$0.00	$0.00	$2.01	$3.24	$4.92	$6.83
Lost jobs due to reduced commercial business activity	0	0	81	130	198	275
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.31	$0.50	$0.76	$1.06
Lost utility revenues	$0.00	$1.22	$3.31	$4.76	$6.73	$8.97
Fort Bend County MUD #67						
Monetary value of domestic water shortages	$0.00	$2.70	$7.33	$7.30	$7.30	$7.30
Lost income from reduced commercial business activity	$0.00	$0.00	$0.55	$0.54	$0.54	$0.54
Lost jobs due to reduced commercial business activity	0	0	22	22	22	22
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.49	$0.97	$0.97	$0.97	$0.97
Fort Bend County MUD #69						
Monetary value of domestic water shortages	$0.00	$1.58	$4.28	$4.28	$4.28	$4.28
Lost income from reduced commercial business activity	$0.00	$0.00	$0.32	$0.32	$0.32	$0.32
Lost jobs due to reduced commercial business activity	0	0	13	13	13	13
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.05	$0.05	$0.05	$0.05
Lost utility revenues	$0.00	$0.29	$0.57	$0.57	$0.57	$0.57
Fort Bend County MUD #81						
Monetary value of domestic water shortages	$0.00	$3.40	$12.11	$16.49	$22.31	$28.95
Lost income from reduced commercial business activity	$0.00	$0.00	$0.90	$1.41	$4.16	$5.70
Lost jobs due to reduced commercial business activity	0	0	36	57	167	229
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.14	$0.22	$0.65	$0.88
Lost utility revenues	$0.00	$0.61	$1.60	$2.25	$3.10	$4.08

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Fountain View Sub.						
Monetary value of domestic water shortages	$2.25	$11.60	$17.27	$12.02	$17.55	$28.36
Lost income from reduced commercial business activity	$0.00	$0.69	$0.97	$1.11	$1.27	$1.43
Lost jobs due to reduced commercial business activity	0	28	39	45	51	58
Lost state and local taxes from reduced commercial business activity	$0.00	$0.11	$0.15	$0.17	$0.20	$0.22
Lost utility revenues	$0.20	$0.54	$0.69	$0.78	$0.88	$0.98
Freeport						
Monetary value of domestic water shortages	$0.00	$0.33	$0.86	$1.39	$6.70	$9.56
Lost utility revenues	$0.00	$0.53	$1.09	$1.57	$2.13	$2.76
Fulshear						
Monetary value of domestic water shortages	$0.00	$1.45	$4.97	$7.87	$11.18	$15.14
Lost income from reduced commercial business activity	$0.00	$0.00	$0.37	$1.09	$1.56	$2.12
Lost jobs due to reduced commercial business activity	0	0	15	44	63	85
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.17	$0.24	$0.33
Lost utility revenues	$0.00	$0.26	$0.66	$0.88	$1.18	$1.53
Galena Park						
Monetary value of domestic water shortages	$0.10	$0.10	$0.11	$0.12	$0.16	$0.22
Lost utility revenues	$0.18	$0.19	$0.21	$0.22	$0.28	$0.37
Green Trails MUD						
Monetary value of domestic water shortages	$0.56	$9.26	$13.11	$17.12	$19.10	$21.07
Lost income from reduced commercial business activity	$0.00	$0.18	$0.60	$0.70	$0.81	$0.91
Lost jobs due to reduced commercial business activity	0	7	48	57	65	73
Lost state and local taxes from reduced commercial business activity	$0.56	$8.80	$12.35	$16.23	$17.98	$19.80
Lost utility revenues	$0.00	$0.03	$0.09	$0.11	$0.13	$0.14

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
HMW SUD						
Monetary value of domestic water shortages	$2.25	$11.57	$17.50	$12.10	$18.48	$30.92
Lost income from reduced commercial business activity	$0.00	$0.00	$2.98	$2.06	$4.96	$8.27
Lost jobs due to reduced commercial business activity	0	0	94	65	156	261
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.42	$0.29	$0.71	$1.18
Lost utility revenues	$0.71	$1.45	$2.20	$2.17	$3.46	$4.93
Hardin						
Monetary value of domestic water shortages	$0.00	$0.02	$0.06	$0.11	$0.62	$0.89
Lost utility revenues	$0.00	$0.04	$0.07	$0.11	$0.15	$0.20
Hardin WSC						
Monetary value of domestic water shortages	$0.00	$0.14	$0.36	$2.46	$3.66	$5.83
Lost utility revenues	$0.00	$0.20	$0.40	$0.59	$0.80	$1.05
Harris Co. FWSD #47						
Monetary value of domestic water shortages	$0.05	$0.04	$0.03	$0.02	$0.01	$0.01
Lost utility revenues	$0.10	$0.08	$0.05	$0.03	$0.02	$0.02
Harris Co. FWSD #51						
Monetary value of domestic water shortages	$0.77	$0.69	$0.48	$0.44	$0.44	$0.44
Lost utility revenues	$0.90	$0.80	$0.77	$0.70	$0.70	$0.70
Harris Co. FWSD #6						
Monetary value of domestic water shortages	$1.72	$3.27	$5.26	$4.13	$4.84	$6.78
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.28	$0.35	$0.44
Lost jobs due to reduced commercial business activity	0	0	0	22	28	36
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.04	$0.05	$0.07
Lost utility revenues	$0.25	$0.34	$0.43	$0.54	$0.64	$0.75

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Harris Co. MUD #11						
Monetary value of domestic water shortages	$1.37	$6.21	$8.13	$9.50	$10.55	$11.53
Lost income from reduced commercial business activity	$0.00	$0.84	$1.16	$1.32	$1.49	$1.42
Lost jobs due to reduced commercial business activity	0	34	47	53	60	57
Lost state and local taxes from reduced commercial business activity	$0.00	$0.13	$0.18	$0.20	$0.23	$0.22
Lost utility revenues	$0.25	$0.65	$0.83	$0.93	$1.03	$1.15
Harris Co. MUD #119						
Monetary value of domestic water shortages	$1.85	$11.52	$12.96	$12.69	$12.54	$12.54
Lost income from reduced commercial business activity	$0.00	$1.63	$2.00	$1.96	$1.94	$1.94
Lost jobs due to reduced commercial business activity	0	66	80	79	78	78
Lost state and local taxes from reduced commercial business activity	$0.00	$0.25	$0.31	$0.30	$0.30	$0.30
Lost utility revenues	$0.48	$1.18	$1.32	$1.29	$1.27	$1.27
Harris Co. MUD #132						
Monetary value of domestic water shortages	$3.70	$27.29	$37.18	$45.60	$58.69	$67.07
Lost income from reduced commercial business activity	$0.00	$3.87	$5.74	$7.01	$8.25	$9.55
Lost jobs due to reduced commercial business activity	0	156	231	282	332	384
Lost state and local taxes from reduced commercial business activity	$0.00	$0.60	$0.89	$1.09	$1.28	$1.48
Lost utility revenues	$0.96	$2.79	$3.78	$4.52	$5.25	$6.02
Harris Co. MUD #151						
Monetary value of domestic water shortages	$2.69	$16.75	$19.59	$19.46	$19.46	$19.46
Lost income from reduced commercial business activity	$0.00	$2.26	$2.80	$2.78	$2.78	$2.78
Lost jobs due to reduced commercial business activity	0	91	113	112	112	112
Lost state and local taxes from reduced commercial business activity	$0.00	$0.35	$0.43	$0.43	$0.43	$0.43
Lost utility revenues	$0.70	$1.62	$1.84	$1.83	$1.83	$1.83
* MUDs are not necessarily listed in numerical order.						

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Harris Co. MUD #152						
Monetary value of domestic water shortages	$1.66	$12.72	$17.70	$22.11	$29.11	$33.65
Lost income from reduced commercial business activity	$0.00	$1.81	$2.73	$3.40	$4.11	$4.81
Lost jobs due to reduced commercial business activity	0	73	110	137	165	193
Lost state and local taxes from reduced commercial business activity	$0.00	$0.28	$0.42	$0.53	$0.64	$0.75
Lost utility revenues	$0.43	$1.30	$1.80	$2.19	$2.61	$3.02
Harris Co. MUD #154						
Monetary value of domestic water shortages	$0.67	$61.56	$90.21	$109.53	$128.25	$148.59
Lost income from reduced commercial business activity	$0.00	$1.02	$2.02	$2.97	$5.68	$6.58
Lost jobs due to reduced commercial business activity	$0.00	$1.48	$2.17	$2.63	$3.07	$3.56
Lost state and local taxes from reduced commercial business activity	$0.00	$0.23	$0.34	$0.41	$0.48	$0.55
Lost utility revenues	$0.37	$1.06	$1.43	$1.70	$1.96	$2.25
Harris Co. MUD #158						
Monetary value of domestic water shortages	$0.00	$0.01	$0.06	$0.05	$0.05	$0.05
Lost utility revenues	$0.00	$0.01	$0.11	$0.09	$0.09	$0.09
Harris Co. MUD #180						
Monetary value of domestic water shortages	$1.30	$9.30	$12.46	$15.09	$19.24	$21.90
Lost income from reduced commercial business activity	$0.00	$1.32	$1.92	$2.31	$2.70	$3.11
Lost jobs due to reduced commercial business activity	0	53	77	93	108	125
Lost state and local taxes from reduced commercial business activity	$0.00	$0.20	$0.30	$0.36	$0.42	$0.48
Lost utility revenues	$0.34	$0.95	$1.27	$1.50	$1.72	$1.96
Harris Co. MUD #189						
Monetary value of domestic water shortages	$0.39	$6.73	$16.33	$19.80	$25.27	$28.78
Lost income from reduced commercial business activity	$0.00	$1.73	$2.52	$3.04	$3.54	$4.09
Lost jobs due to reduced commercial business activity	0	69	101	122	143	164
Lost state and local taxes from reduced commercial business activity	$0.00	$0.27	$0.39	$0.47	$0.55	$0.63
Lost utility revenues	$0.44	$1.24	$1.66	$1.96	$2.26	$2.58

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Harris Co. MUD #261						
Monetary value of domestic water shortages	$0.30	$7.55	$14.28	$11.78	$11.78	$11.78
Lost utility revenues	$0.37	$1.08	$1.25	$1.24	$1.24	$1.24
Harris Co. MUD #345						
Monetary value of domestic water shortages	$2.99	$17.59	$20.22	$20.76	$23.00	$23.00
Lost income from reduced commercial business activity	$0.00	$2.50	$3.12	$3.11	$3.11	$3.11
Lost jobs due to reduced commercial business activity	0	100	125	125	125	125
Lost state and local taxes from reduced commercial business activity	$0.00	$0.39	$0.48	$0.48	$0.48	$0.48
Lost utility revenues	$0.78	$1.80	$2.05	$2.05	$2.05	$2.05
Harris Co. MUD #46						
Monetary value of domestic water shortages	$1.77	$10.30	$11.64	$11.91	$13.19	$13.19
Lost income from reduced commercial business activity	$0.00	$1.46	$1.80	$1.78	$1.78	$1.78
Lost jobs due to reduced commercial business activity	0	59	72	72	72	72
Lost state and local taxes from reduced commercial business activity	$0.00	$0.23	$0.28	$0.28	$0.28	$0.28
Lost utility revenues	$0.46	$1.05	$1.18	$1.17	$1.17	$1.17
Harris Co. MUD #5						
Monetary value of domestic water shortages	$1.38	$8.05	$16.58	$9.12	$9.96	$9.96
Lost income from reduced commercial business activity	$0.00	$1.14	$1.40	$1.37	$1.35	$1.35
Lost jobs due to reduced commercial business activity	0	46	56	55	54	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.18	$0.22	$0.21	$0.21	$0.21
Lost utility revenues	$0.39	$0.89	$0.99	$0.97	$0.96	$0.96
Harris Co. MUD #50						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.03	$0.09	$0.17
Lost utility revenues	$0.00	$0.00	$0.00	$0.06	$0.15	$0.24

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Harris Co. WCID #133						
Monetary value of domestic water shortages	$0.46	$9.92	$10.78	$10.63	$10.71	$10.71
Lost income from reduced commercial business activity	$0.00	$1.34	$1.66	$1.64	$1.65	$1.65
Lost jobs due to reduced commercial business activity	0	54	67	66	66	66
Lost state and local taxes from reduced commercial business activity	$0.00	$0.21	$0.26	$0.25	$0.26	$0.26
Lost utility revenues	$0.45	$1.04	$1.18	$1.17	$1.18	$1.18
Harris Co. WCID #21						
Monetary value of domestic water shortages	$0.65	$0.67	$0.74	$0.80	$2.93	$3.63
Lost utility revenues	$0.66	$0.75	$0.83	$0.90	$1.01	$1.15
Harris Co. WCID #36						
Monetary value of domestic water shortages	$0.35	$0.63	$0.77	$3.06	$3.99	$5.21
Lost utility revenues	$0.50	$0.71	$0.87	$1.06	$1.27	$1.50
Harris Co. WCID #50						
Monetary value of domestic water shortages	$19.77	$21.91	$23.83	$14.39	$15.60	$16.95
Lost income from reduced commercial business activity	$1.61	$1.79	$1.96	$2.13	$2.31	$2.52
Lost jobs due to reduced commercial business activity	65	72	79	86	93	101
Lost state and local taxes from reduced commercial business activity	$1.08	$1.19	$1.30	$1.40	$1.52	$1.66
Lost utility revenues	$0.18	$3.82	$5.45	$5.33	$5.26	$5.26
Harris Co. WCID #76						
Monetary value of domestic water shortages	$0.18	$3.82	$5.45	$5.33	$5.26	$5.26
Lost utility revenues	$0.18	$0.40	$0.45	$0.44	$0.43	$0.43
Harris Co. WCID #84						
Monetary value of domestic water shortages	$2.09	$2.11	$2.13	$2.11	$2.17	$2.26
Lost utility revenues	$0.46	$0.46	$0.47	$0.46	$0.48	$0.50

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Hedwig Village						
Monetary value of domestic water shortages	$7.60	$7.60	$8.99	$8.98	$9.10	$9.18
Lost income from reduced commercial business activity	$1.47	$1.49	$1.51	$1.53	$1.56	$1.59
Lost jobs due to reduced commercial business activity	46	47	48	48	49	50
Lost state and local taxes from reduced commercial business activity	$0.21	$0.21	$0.22	$0.22	$0.22	$0.23
Lost utility revenues	$1.00	$1.00	$1.00	$1.00	$1.01	$1.02
Hempstead						
Monetary value of domestic water shortages	$0.00	$4.19	$18.12	$19.21	$32.33	$68.46
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$5.45	$17.91	$26.16
Lost jobs due to reduced commercial business activity	0	0	0	172	565	825
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.78	$2.55	$3.73
Lost utility revenues	$0.00	$1.09	$2.27	$3.61	$5.20	$7.06
Hill Crest Village						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.01	$0.01
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.01	$0.02
Hillshire Village						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.04	$0.04	$0.04
Lost utility revenues	$0.00	$0.03	$0.06	$0.06	$0.06	$0.06
Houston						
Monetary value of domestic water shortages	$0.01	$6.51	$12.01	$16.38	$20.20	$60.15
Lost utility revenues	$0.02	$11.66	$19.76	$20.04	$20.41	$77.37
Humble						
Monetary value of domestic water shortages	$7.41	$49.74	$63.56	$70.50	$77.72	$85.35
Lost income from reduced commercial business activity	$0.00	$18.25	$25.22	$28.46	$31.84	$35.41
Lost jobs due to reduced commercial business activity	0	575	795	898	1,004	1,117
Lost state and local taxes from reduced commercial business activity	$0.00	$2.60	$3.59	$4.06	$4.54	$5.05
Lost utility revenues	$1.93	$5.12	$6.44	$7.18	$7.94	$8.75

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Hunters Creek Village						
Monetary value of domestic water shortages	$25.38	$28.35	$39.28	$24.59	$26.43	$28.67
Lost income from reduced commercial business activity	$3.09	$3.52	$3.94	$8.68	$9.57	$10.53
Lost jobs due to reduced commercial business activity	98	111	124	274	302	332
Lost state and local taxes from reduced commercial business activity	$0.44	$0.50	$0.56	$1.24	$1.36	$1.50
Lost utility revenues	$2.10	$2.31	$2.53	$2.73	$2.95	$3.19
Iowa Colony						
Monetary value of domestic water shortages	$0.00	$0.01	$0.02	$0.04	$0.37	$0.59
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.07	$0.10
Jacinto City						
Monetary value of domestic water shortages	$0.00	$0.00	$0.02	$0.07	$0.15	$0.27
Lost utility revenues	$0.00	$0.00	$0.05	$0.14	$0.27	$0.42
Jersey Village						
Monetary value of domestic water shortages	$0.00	$2.75	$10.85	$10.42	$14.58	$17.31
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$2.61	$3.78	$5.00
Lost jobs due to reduced commercial business activity	0	0	0	82	119	158
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.37	$0.54	$0.71
Lost utility revenues	$0.00	$0.87	$1.64	$2.18	$2.71	$3.26
Jewett						
Monetary value of domestic water shortages	$0.00	$0.05	$0.09	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.07	$0.11	$0.10	$0.10	$0.10
Katy						
Monetary value of domestic water shortages	$7.93	$58.27	$80.49	$101.51	$131.87	$154.21
Lost income from reduced commercial business activity	$0.00	$49.14	$73.83	$91.80	$110.75	$131.41
Lost jobs due to reduced commercial business activity	0	1,033	1,543	1,905	2,281	2,686
Lost state and local taxes from reduced commercial business activity	$0.00	$5.00	$7.47	$9.24	$11.08	$13.07
Lost utility revenues	$2.09	$6.04	$8.30	$10.12	$12.03	$14.12

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Kemah						
Monetary value of domestic water shortages	$3.28	$4.33	$4.79	$4.93	$5.00	$5.11
Lost income from reduced commercial business activity	$1.19	$1.54	$1.75	$1.82	$1.85	$1.90
Lost jobs due to reduced commercial business activity	37	49	55	57	58	60
Lost state and local taxes from reduced commercial business activity	$0.17	$0.22	$0.25	$0.26	$0.26	$0.27
Lost utility revenues	$0.37	$0.46	$0.51	$0.52	$0.53	$0.54
Kendleton						
Monetary value of domestic water shortages	$0.00	$0.07	$0.90	$1.64	$4.76	$7.29
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.17	$0.32	$1.01
Lost jobs due to reduced commercial business activity	0	0	0	7	13	41
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.03	$0.05	$0.16
Lost utility revenues	$0.00	$0.09	$0.20	$0.34	$0.53	$0.77
Kenefick						
Monetary value of domestic water shortages	$0.00	$0.02	$0.06	$0.41	$0.61	$0.98
Lost utility revenues	$0.00	$0.04	$0.07	$0.10	$0.13	$0.18
Lake Jackson						
Monetary value of domestic water shortages	$1.44	$1.90	$8.43	$10.78	$12.66	$16.37
Lost utility revenues	$1.83	$2.41	$2.92	$3.42	$4.02	$4.72
Lake Livingston Water Supply and Sewer Co.						
Monetary value of domestic water shortages	$0.00	$0.06	$0.12	$0.15	$0.23	$0.36
Lost utility revenues	$0.00	$0.11	$0.21	$0.25	$0.35	$0.47
Longhorn Town UD						
Monetary value of domestic water shortages	$1.96	$11.33	$17.31	$23.47	$28.59	$33.69
Lost income from reduced commercial business activity	$0.00	$3.97	$6.44	$8.51	$10.56	$12.61
Lost jobs due to reduced commercial business activity	0	125	203	268	333	398
Lost state and local taxes from reduced commercial business activity	$0.00	$0.57	$0.92	$1.21	$1.51	$1.80
Lost utility revenues	$0.35	$1.19	$1.76	$2.27	$2.77	$3.27

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Madison						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.09	$0.12	$0.18
Lost utility revenues	$0.00	$0.07	$0.11	$0.15	$0.20	$0.25
Magnolia						
Monetary value of domestic water shortages	$8.85	$12.18	$16.13	$20.46	$26.25	$33.12
Lost income from reduced commercial business activity	$3.55	$4.89	$6.48	$8.22	$10.54	$13.30
Lost jobs due to reduced commercial business activity	112	154	204	259	332	419
Lost state and local taxes from reduced commercial business activity	$0.51	$0.70	$0.92	$1.17	$1.50	$1.90
Lost utility revenues	$0.20	$0.53	$0.92	$1.34	$1.91	$2.59
Manvel						
Monetary value of domestic water shortages	$0.00	$0.16	$0.16	$0.15	$0.15	$0.15
Lost utility revenues	$0.00	$0.20	$0.20	$0.19	$0.19	$0.19
Mason Creek UD						
Monetary value of domestic water shortages	$4.97	$29.11	$33.04	$32.75	$32.60	$32.60
Lost income from reduced commercial business activity	$0.00	$10.74	$13.25	$13.14	$13.08	$13.08
Lost jobs due to reduced commercial business activity	0	339	418	414	412	412
Lost state and local taxes from reduced commercial business activity	$0.00	$1.53	$1.89	$1.87	$1.86	$1.86
Lost utility revenues	$1.29	$2.98	$3.36	$3.33	$3.31	$3.31
Meadows						
Monetary value of domestic water shortages	$0.00	$4.32	$11.82	$11.68	$11.63	$11.63
Lost income from reduced commercial business activity	$0.00	$0.00	$3.51	$3.47	$3.45	$3.45
Lost jobs due to reduced commercial business activity	0	0	111	109	109	109
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.50	$0.49	$0.49	$0.49
Lost utility revenues	$0.00	$1.12	$2.22	$2.20	$2.18	$2.18
Mercy WSC						
Monetary value of domestic water shortages	$0.00	$0.11	$0.25	$0.62	$1.83	$2.18
Lost utility revenues	$0.00	$0.16	$0.28	$0.37	$0.43	$0.48
Missouri City						
Monetary value of domestic water shortages	$0.00	$0.00	$6.76	$16.42	$95.68	$121.77
Lost utility revenues	$0.00	$0.00	$7.97	$15.07	$20.49	$32.02

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Mont Belvieu						
Monetary value of domestic water shortages	$16.73	$23.27	$29.83	$35.04	$40.45	$46.00
Lost income from reduced commercial business activity	$2.56	$3.76	$4.85	$5.81	$6.80	$7.82
Lost jobs due to reduced commercial business activity	81	118	153	183	214	247
Lost state and local taxes from reduced commercial business activity	$0.37	$0.54	$0.69	$0.83	$0.97	$1.11
Lost utility revenues	$1.53	$2.11	$2.65	$3.12	$3.60	$4.10
Montgomery						
Monetary value of domestic water shortages	$0.51	$16.06	$26.64	$36.18	$39.77	$50.18
Lost income from reduced commercial business activity	$0.00	$6.03	$9.91	$13.74	$13.86	$18.18
Lost jobs due to reduced commercial business activity	0	190	313	433	437	573
Lost state and local taxes from reduced commercial business activity	$0.00	$0.86	$1.41	$1.96	$1.98	$2.59
Lost utility revenues	$0.11	$1.64	$2.59	$3.52	$3.82	$4.85
Montgomery MUD #18						
Monetary value of domestic water shortages	$2.48	$12.20	$20.13	$25.33	$49.72	$115.72
Lost income from reduced commercial business activity	$0.00	$0.00	$2.28	$2.43	$10.49	$17.04
Lost jobs due to reduced commercial business activity	0	0	91	97	420	683
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.35	$0.38	$1.63	$2.64
Lost utility revenues	$0.79	$1.84	$3.81	$4.67	$7.97	$11.81
Montgomery MUD #19						
Monetary value of domestic water shortages	$0.95	$3.61	$3.63	$2.35	$3.63	$5.07
Lost income from reduced commercial business activity	$0.00	$0.00	$0.23	$0.13	$0.25	$0.34
Lost jobs due to reduced commercial business activity	0	0	9	5	10	14
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.02	$0.04	$0.05
Lost utility revenues	$0.21	$0.38	$0.47	$0.38	$0.49	$0.56
Montgomery MUD #8						
Monetary value of domestic water shortages	$1.74	$8.72	$10.80	$10.85	$12.51	$16.52
Lost income from reduced commercial business activity	$0.00	$0.00	$0.68	$0.61	$0.92	$1.15
Lost jobs due to reduced commercial business activity	0	0	27	24	37	46
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.11	$0.09	$0.14	$0.18
Lost utility revenues	$0.38	$0.92	$1.39	$1.37	$1.64	$1.84

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Montgomery MUD #9						
Monetary value of domestic water shortages	$1.64	$8.66	$11.58	$11.73	$13.67	$18.67
Lost income from reduced commercial business activity	$0.00	$0.00	$0.77	$0.65	$1.01	$1.29
Lost jobs due to reduced commercial business activity	0	0	31	26	40	52
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.12	$0.10	$0.16	$0.20
Lost utility revenues	$0.36	$0.91	$1.50	$1.47	$1.81	$2.06
Montgomery MUD #2						
Monetary value of domestic water shortages	$1.15	$4.40	$4.47	$4.94	$5.55	$7.11
Lost income from reduced commercial business activity	$0.00	$0.00	$0.28	$0.37	$0.46	$0.53
Lost jobs due to reduced commercial business activity	0	0	11	15	18	21
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.06	$0.07	$0.08
Lost utility revenues	$0.25	$0.46	$0.57	$0.65	$0.73	$0.79
Montgomery MUD #3						
Monetary value of domestic water shortages	$1.00	$4.02	$4.60	$4.48	$6.34	$9.69
Lost income from reduced commercial business activity	$0.00	$0.00	$0.29	$0.18	$0.41	$0.64
Lost jobs due to reduced commercial business activity	0	0	11	7	16	26
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.03	$0.06	$0.10
Lost utility revenues	$0.22	$0.42	$0.59	$0.53	$0.79	$1.08
Montgomery MUD #4						
Monetary value of domestic water shortages	$2.03	$7.72	$7.87	$6.75	$8.27	$10.85
Lost income from reduced commercial business activity	$0.00	$0.00	$0.49	$0.27	$0.53	$0.73
Lost jobs due to reduced commercial business activity	0	0	20	11	21	29
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.04	$0.08	$0.11
Lost utility revenues	$0.45	$0.81	$1.01	$0.81	$1.04	$1.21
Montgomery County WCID #1						
Monetary value of domestic water shortages	$1.03	$4.13	$4.73	$5.98	$7.80	$12.48
Lost income from reduced commercial business activity	$0.00	$0.00	$0.30	$0.45	$1.28	$1.72
Lost jobs due to reduced commercial business activity	0	0	12	18	51	69
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.05	$0.07	$0.20	$0.27
Lost utility revenues	$0.23	$0.44	$0.61	$0.79	$1.02	$1.29

Municipal (cont.)	2010	2020	2030	2040	2050	2060
Needville						
Monetary value of domestic water shortages	$0.00	$0.20	$2.36	$6.33	$6.26	$10.66
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$1.26	$2.07
Lost jobs due to reduced commercial business activity	0	0	0	0	40	65
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.18	$0.29
Lost utility revenues	$0.00	$0.19	$0.43	$0.67	$1.00	$1.40
New Caney MUD						
Monetary value of domestic water shortages	$1.93	$8.47	$11.32	$16.01	$27.42	$29.52
Lost income from reduced commercial business activity	$0.00	$0.00	$2.88	$4.83	$15.46	$23.02
Lost jobs due to reduced commercial business activity	0	0	91	152	488	726
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.41	$0.69	$2.20	$3.28
Lost utility revenues	$0.61	$1.28	$2.10	$3.02	$4.38	$6.08
New Waverly						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.03	$0.05	$0.04	$0.03	$0.03
Normangee						
Monetary value of domestic water shortages	$0.00	$0.02	$0.04	$0.03	$0.03	$0.04
Lost utility revenues	$0.00	$0.03	$0.05	$0.05	$0.04	$0.05
North Belt UD						
Monetary value of domestic water shortages	$0.28	$7.93	$11.38	$12.76	$17.50	$20.28
Lost income from reduced commercial business activity	$0.00	$1.07	$1.63	$2.04	$2.47	$2.90
Lost jobs due to reduced commercial business activity	0	43	65	82	99	116
Lost state and local taxes from reduced commercial business activity	$0.00	$0.17	$0.25	$0.32	$0.38	$0.45
Lost utility revenues	$0.28	$0.83	$1.16	$1.42	$1.70	$1.97
North Fort Bend Water Authority						
Monetary value of domestic water shortages	$0.00	$8.10	$169.31	$178.63	$330.72	$413.42
Lost income from reduced commercial business activity	$0.00	$0.09	$1.88	$2.51	$303.68	$405.39
Lost jobs due to reduced commercial business activity	0	3	59	79	4,676	6,229
Lost state and local taxes from reduced commercial business activity	$0.00	$0.01	$0.27	$0.36	$24.28	$32.36
Lost utility revenues	$0.00	$7.34	$39.28	$61.96	$80.05	$96.19

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
North Green MUD						
Monetary value of domestic water shortages	$1.15	$5.01	$6.30	$6.75	$7.26	$7.82
Lost income from reduced commercial business activity	$0.00	$0.67	$0.90	$0.96	$1.04	$1.12
Lost jobs due to reduced commercial business activity	0	27	36	39	42	45
Lost state and local taxes from reduced commercial business activity	$0.00	$0.10	$0.14	$0.15	$0.16	$0.17
Lost utility revenues	$0.21	$0.52	$0.64	$0.69	$0.74	$0.80
North Harris County Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$500.43	$581.32	$632.60	$660.64	$685.97
Lost income from reduced commercial business activity	$0.00	$0.00	$547.06	$626.69	$658.95	$697.63
Lost jobs due to reduced commercial business activity	0	0	12,171	13,942	14,660	15,521
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$58.22	$66.69	$70.13	$74.24
Lost utility revenues	$0.16	$92.49	$132.44	$145.56	$150.87	$157.24
Northwest Harris County MUD #23						
Monetary value of domestic water shortages	$1.93	$9.63	$13.58	$17.02	$19.98	$22.93
Lost income from reduced commercial business activity	$0.00	$1.30	$1.94	$2.35	$2.81	$3.27
Lost jobs due to reduced commercial business activity	0	52	78	94	113	131
Lost state and local taxes from reduced commercial business activity	$0.00	$0.20	$0.30	$0.36	$0.44	$0.51
Lost utility revenues	$0.35	$1.01	$1.38	$1.64	$1.93	$2.22
Northwest Park MUD						
Monetary value of domestic water shortages	$5.96	$42.93	$49.42	$48.43	$47.96	$47.96
Lost income from reduced commercial business activity	$0.00	$15.84	$19.82	$19.42	$19.24	$19.24
Lost jobs due to reduced commercial business activity	0	499	625	613	607	607
Lost state and local taxes from reduced commercial business activity	$0.00	$2.26	$2.83	$2.77	$2.74	$2.74
Lost utility revenues	$1.55	$4.39	$5.02	$4.92	$4.87	$4.87
Oak Ridge North						
Monetary value of domestic water shortages	$1.41	$5.96	$7.26	$7.50	$10.85	$17.91
Lost income from reduced commercial business activity	$0.00	$0.00	$1.17	$0.79	$1.88	$3.08
Lost jobs due to reduced commercial business activity	0	0	37	25	59	97
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.17	$0.11	$0.27	$0.44
Lost utility revenues	$0.31	$0.63	$0.93	$0.90	$1.41	$1.99

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Old River-Winfree						
Monetary value of domestic water shortages	$3.89	$4.26	$4.53	$4.75	$5.08	$5.45
Lost income from reduced commercial business activity	$0.24	$0.26	$0.28	$0.30	$0.32	$0.35
Lost jobs due to reduced commercial business activity	9	11	11	12	13	14
Lost state and local taxes from reduced commercial business activity	$0.04	$0.04	$0.04	$0.05	$0.05	$0.05
Lost utility revenues	$0.34	$0.38	$0.40	$0.42	$0.45	$0.49
Onalaska						
Monetary value of domestic water shortages	$0.00	$0.06	$0.14	$0.76	$1.02	$1.23
Lost utility revenues	$0.00	$0.08	$0.14	$0.18	$0.22	$0.27
Orbit Systems, Inc.						
Monetary value of domestic water shortages	$0.00	$0.11	$0.41	$1.97	$2.84	$3.97
Lost utility revenues	$0.00	$0.15	$0.31	$0.45	$0.59	$0.76
Oyster Creek						
Monetary value of domestic water shortages	$0.28	$0.61	$1.08	$0.26	$0.33	$1.93
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14
Lost jobs due to reduced commercial business activity	0	0	0	0	0	6
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02
Lost utility revenues	$0.07	$0.11	$0.15	$0.19	$0.24	$0.29
Panorama Village						
Monetary value of domestic water shortages	$1.35	$5.43	$8.75	$5.22	$6.49	$9.26
Lost income from reduced commercial business activity	$0.00	$0.00	$0.93	$0.55	$1.12	$1.60
Lost jobs due to reduced commercial business activity	0	0	29	17	35	50
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.13	$0.08	$0.16	$0.23
Lost utility revenues	$0.30	$0.57	$0.74	$0.63	$0.85	$1.03
Parkway UD						
Monetary value of domestic water shortages	$4.71	$4.61	$4.48	$4.36	$4.28	$4.32
Lost income from reduced commercial business activity	$0.67	$0.66	$0.64	$0.62	$0.61	$0.62
Lost jobs due to reduced commercial business activity	27	26	26	25	25	25
Lost state and local taxes from reduced commercial business activity	$0.10	$0.10	$0.10	$0.10	$0.09	$0.10
Lost utility revenues	$0.48	$0.47	$0.46	$0.44	$0.44	$0.44

Municipal (cont.)	2010	2020	2030	2040	2050	2060
Patton Village						
Monetary value of domestic water shortages	$0.18	$0.70	$0.82	$1.05	$1.39	$2.33
Lost income from reduced commercial business activity	$0.00	$0.00	$0.05	$0.08	$0.23	$0.32
Lost jobs due to reduced commercial business activity	0	0	2	3	9	13
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.01	$0.01	$0.04	$0.05
Lost utility revenues	$0.04	$0.07	$0.10	$0.14	$0.18	$0.24
Pearland						
Monetary value of domestic water shortages	$0.00	$0.00	$1.83	$5.45	$11.37	$56.64
Lost utility revenues	$0.00	$0.00	$3.28	$7.78	$12.92	$18.27
Pine Island						
Monetary value of domestic water shortages	$0.00	$0.24	$0.83	$2.11	$2.49	$3.34
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.35	$0.56
Lost jobs due to reduced commercial business activity	0	0	0	0	11	18
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.05	$0.08
Lost utility revenues	$0.00	$0.06	$0.12	$0.18	$0.27	$0.37
Pine Trails Utility						
Monetary value of domestic water shortages	$0.44	$1.80	$2.32	$2.71	$3.44	$4.39
Lost utility revenues	$0.50	$0.62	$0.74	$0.86	$0.99	$1.14
Piney Point Village						
Monetary value of domestic water shortages	$8.91	$9.36	$9.91	$10.35	$10.88	$11.46
Lost income from reduced commercial business activity	$2.26	$2.44	$2.62	$2.79	$5.99	$6.44
Lost jobs due to reduced commercial business activity	71	77	83	88	189	203
Lost state and local taxes from reduced commercial business activity	$0.32	$0.35	$0.37	$0.40	$0.85	$0.92
Lost utility revenues	$1.53	$1.62	$1.70	$1.79	$1.89	$2.00
Plantation MUD						
Monetary value of domestic water shortages	$0.00	$1.82	$4.88	$4.79	$4.76	$4.76
Lost income from reduced commercial business activity	$0.00	$0.00	$0.94	$0.92	$0.92	$0.92
Lost jobs due to reduced commercial business activity	0	0	30	29	29	29
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.13	$0.13	$0.13	$0.13
Lost utility revenues	$0.00	$0.33	$0.65	$0.63	$0.63	$0.63

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Pleak						
Monetary value of domestic water shortages	$0.00	$0.14	$0.45	$3.14	$5.66	$8.70
Lost utility revenues	$0.00	$0.20	$0.44	$0.69	$1.02	$1.40
Plum Grove						
Monetary value of domestic water shortages	$0.00	$0.06	$0.72	$0.79	$0.91	$1.43
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.48
Lost jobs due to reduced commercial business activity	0	0	0	0	0	15
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Lost utility revenues	$0.00	$0.07	$0.13	$0.20	$0.27	$0.35
Point Aquarius MUD						
Monetary value of domestic water shortages	$1.51	$7.24	$11.23	$18.14	$32.34	$51.26
Lost income from reduced commercial business activity	$0.00	$0.00	$0.77	$2.98	$4.90	$7.14
Lost jobs due to reduced commercial business activity	0	0	31	119	196	286
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.12	$0.46	$0.76	$1.11
Lost utility revenues	$0.33	$0.76	$1.46	$2.37	$3.59	$5.01
Point Blank						
Monetary value of domestic water shortages	$0.00	$0.01	$0.03	$0.04	$0.05	$0.05
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.05	$0.05
Porter WSC						
Monetary value of domestic water shortages	$2.57	$11.07	$13.03	$19.78	$40.27	$43.97
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$11.96	$14.60	$16.82
Lost jobs due to reduced commercial business activity	0	0	0	189	460	530
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$1.70	$2.08	$2.40
Lost utility revenues	$0.82	$1.67	$2.62	$3.73	$4.13	$4.49
Prairie View						
Monetary value of domestic water shortages	$0.00	$0.11	$0.27	$0.51	$0.97	$5.47
Lost utility revenues	$0.00	$0.18	$0.39	$0.64	$0.94	$1.31

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Rayford Road MUD						
Monetary value of domestic water shortages	$4.78	$18.25	$22.44	$18.33	$19.03	$25.68
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$1.28	$1.73
Lost jobs due to reduced commercial business activity	0	0	0	0	51	69
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.20	$0.27
Lost utility revenues	$0.97	$1.78	$2.19	$1.79	$2.30	$2.67
Richmond						
Monetary value of domestic water shortages	$0.08	$0.11	$0.12	$0.15	$0.18	$0.95
Lost utility revenues	$0.11	$0.14	$0.15	$0.17	$0.20	$1.36
River Plantation MUD						
Monetary value of domestic water shortages	$1.72	$6.56	$6.59	$5.65	$6.69	$9.14
Lost income from reduced commercial business activity	$0.00	$0.00	$1.07	$0.60	$1.17	$1.59
Lost jobs due to reduced commercial business activity	0	0	34	19	37	50
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.15	$0.09	$0.17	$0.23
Lost utility revenues	$0.38	$0.69	$0.85	$0.68	$0.87	$1.02
Riverside WSC						
Monetary value of domestic water shortages	$0.00	$0.05	$0.70	$2.32	$2.97	$2.79
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.50
Lost jobs due to reduced commercial business activity	0	0	0	0	0	16
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Lost utility revenues	$0.00	$0.06	$0.13	$0.33	$0.44	$0.59
Rolling Fork MUD						
Monetary value of domestic water shortages	$14.23	$14.70	$15.18	$15.66	$16.25	$16.91
Lost income from reduced commercial business activity	$2.20	$2.27	$2.35	$2.42	$2.51	$2.61
Lost jobs due to reduced commercial business activity	88	91	94	97	101	105
Lost state and local taxes from reduced commercial business activity	$0.34	$0.35	$0.36	$0.38	$0.39	$0.41
Lost utility revenues	$0.42	$1.01	$1.19	$1.24	$1.30	$1.36

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Roman Forest						
Monetary value of domestic water shortages	$1.13	$9.56	$13.74	$21.53	$32.24	$46.28
Lost income from reduced commercial business activity	$0.00	$0.00	$2.41	$7.87	$11.97	$16.87
Lost jobs due to reduced commercial business activity	0	0	76	248	378	532
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.34	$1.12	$1.71	$2.41
Lost utility revenues	$0.25	$0.83	$1.53	$2.28	$3.28	$4.48
Rosenberg						
Monetary value of domestic water shortages	$0.00	$0.00	$0.41	$3.72	$35.71	$7.45
Lost utility revenues	$0.00	$0.00	$0.47	$3.35	$7.26	$11.90
San Felipe						
Monetary value of domestic water shortages	$0.00	$0.03	$0.06	$0.08	$0.09	$0.11
Lost utility revenues	$0.00	$0.04	$0.07	$0.09	$0.09	$0.10
Seabrook						
Monetary value of domestic water shortages	$9.85	$9.91	$21.30	$25.08	$47.21	$53.63
Lost income from reduced commercial business activity	$7.03	$10.74	$14.31	$18.15	$21.96	$25.99
Lost jobs due to reduced commercial business activity	157	239	319	405	490	579
Lost state and local taxes from reduced commercial business activity	$0.75	$1.14	$1.52	$1.93	$2.34	$2.77
Lost utility revenues	$2.31	$3.07	$3.80	$4.58	$5.35	$6.16
Sealy						
Monetary value of domestic water shortages	$0.00	$0.46	$0.99	$3.83	$4.53	$5.13
Lost utility revenues	$0.00	$0.66	$1.11	$1.33	$1.44	$1.63
Shenandoah						
Monetary value of domestic water shortages	$2.31	$10.39	$12.29	$12.32	$17.24	$27.09
Lost income from reduced commercial business activity	$0.00	$0.00	$3.07	$2.01	$4.62	$7.45
Lost jobs due to reduced commercial business activity	0	0	97	63	146	235
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.44	$0.29	$0.66	$1.06
Lost utility revenues	$0.73	$1.57	$2.27	$2.13	$3.23	$4.44

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Shephard						
Monetary value of domestic water shortages	$0.00	$0.07	$0.17	$0.22	$0.25	$0.26
Lost utility revenues	$0.00	$0.11	$0.18	$0.22	$0.24	$0.26
Sienna Plantation MUD #2						
Monetary value of domestic water shortages	$0.00	$3.99	$10.88	$10.82	$10.82	$10.82
Lost income from reduced commercial business activity	$0.00	$0.00	$2.10	$2.09	$2.09	$2.09
Lost jobs due to reduced commercial business activity	0	0	66	66	66	66
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.30	$0.30	$0.30	$0.30
Lost utility revenues	$0.00	$0.67	$1.33	$1.32	$1.32	$1.32
Simonton						
Monetary value of domestic water shortages	$0.00	$0.14	$1.90	$0.00	$0.00	$10.41
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.49
Lost jobs due to reduced commercial business activity	0	0	0	0	0	47
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.21
Lost utility revenues	$0.00	$0.15	$0.34	$0.53	$0.79	$1.09
Southern Montgomery County MUD						
Monetary value of domestic water shortages	$2.52	$12.33	$12.61	$11.31	$13.61	$18.48
Lost income from reduced commercial business activity	$0.00	$0.00	$1.21	$0.71	$1.41	$1.96
Lost jobs due to reduced commercial business activity	0	0	49	29	57	79
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.19	$0.11	$0.22	$0.30
Lost utility revenues	$0.80	$1.86	$2.33	$1.96	$2.55	$3.03
Southside Place						
Monetary value of domestic water shortages	$0.01	$0.27	$0.08	$0.13	$0.17	$0.25
Lost utility revenues	$0.01	$0.07	$0.11	$0.16	$0.22	$0.28
Southwest Utilities						
Monetary value of domestic water shortages	$2.86	$12.74	$16.62	$19.90	$24.88	$29.29
Lost income from reduced commercial business activity	$0.00	$3.67	$5.29	$6.05	$7.38	$8.56
Lost jobs due to reduced commercial business activity	0	116	168	193	241	281
Lost state and local taxes from reduced commercial business activity	$0.00	$0.52	$0.76	$0.87	$1.06	$1.24
Lost utility revenues	$0.50	$1.26	$1.68	$1.98	$2.36	$2.81

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Splendora						
Monetary value of domestic water shortages	$0.39	$1.79	$2.41	$3.58	$6.74	$9.69
Lost income from reduced commercial business activity	$0.00	$0.00	$0.15	$0.28	$0.92	$1.35
Lost jobs due to reduced commercial business activity	0	0	6	11	37	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.04	$0.14	$0.21
Lost utility revenues	$0.09	$0.19	$0.31	$0.47	$0.71	$0.98
Spring Creek UD						
Monetary value of domestic water shortages	$1.11	$4.89	$6.47	$7.27	$11.42	$19.80
Lost income from reduced commercial business activity	$0.00	$0.00	$0.40	$0.29	$0.78	$2.72
Lost jobs due to reduced commercial business activity	0	0	16	12	31	109
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.05	$0.12	$0.42
Lost utility revenues	$0.23	$0.48	$0.77	$0.80	$1.37	$2.05
Spring Valley						
Monetary value of domestic water shortages	$2.89	$13.65	$18.14	$18.89	$19.86	$21.43
Lost income from reduced commercial business activity	$0.00	$4.23	$5.46	$5.68	$5.98	$6.31
Lost jobs due to reduced commercial business activity	0	133	172	179	188	199
Lost state and local taxes from reduced commercial business activity	$0.00	$0.60	$0.78	$0.81	$0.85	$0.90
Lost utility revenues	$0.53	$1.27	$1.50	$1.55	$1.62	$1.70
Stagecoach						
Monetary value of domestic water shortages	$0.16	$0.85	$1.99	$2.01	$3.99	$6.25
Lost income from reduced commercial business activity	$0.00	$0.00	$0.09	$0.33	$0.55	$0.87
Lost jobs due to reduced commercial business activity	0	0	4	13	22	35
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.01	$0.05	$0.09	$0.13
Lost utility revenues	$0.04	$0.09	$0.16	$0.26	$0.40	$0.60
Stanley Lake MUD						
Monetary value of domestic water shortages	$1.53	$7.20	$10.64	$6.27	$7.47	$10.73
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.25	$0.50	$0.68
Lost jobs due to reduced commercial business activity	0	0	0	10	20	27
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.04	$0.08	$0.11
Lost utility revenues	$0.34	$0.76	$0.94	$0.76	$0.97	$1.14

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Sugarland						
Monetary value of domestic water shortages	$0.00	$0.00	$2.46	$2.38	$2.38	$3.70
Lost utility revenues	$0.00	$0.00	$4.40	$4.26	$4.26	$5.91
Sunbelt FWSD						
Monetary value of domestic water shortages	$1.40	$30.82	$75.69	$89.34	$103.77	$117.01
Lost income from reduced commercial business activity	$0.00	$3.57	$11.02	$13.33	$15.59	$17.97
Lost jobs due to reduced commercial business activity	0	143	441	534	624	720
Lost state and local taxes from reduced commercial business activity	$0.00	$0.55	$1.71	$2.07	$2.42	$2.79
Lost utility revenues	$1.58	$5.81	$7.79	$9.14	$10.47	$11.88
Surfside Beach						
Monetary value of domestic water shortages	$0.00	$0.03	$0.06	$0.11	$0.16	$0.93
Lost utility revenues	$0.00	$0.04	$0.08	$0.12	$0.16	$0.20
Sweeney						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.10	$0.15	$0.24
Lost utility revenues	$0.00	$0.06	$0.11	$0.15	$0.22	$0.30
Tomball						
Monetary value of domestic water shortages	$1.27	$41.40	$55.40	$83.23	$97.91	$119.44
Lost income from reduced commercial business activity	$0.00	$34.67	$50.44	$68.67	$82.04	$101.67
Lost jobs due to reduced commercial business activity	0	773	1,124	1,531	1,829	2,266
Lost state and local taxes from reduced commercial business activity	$0.00	$3.69	$5.37	$7.31	$8.73	$10.82
Lost utility revenues	$1.44	$4.23	$5.63	$7.45	$8.78	$10.74
Trail of the Lakes MUD						
Monetary value of domestic water shortages	$2.98	$17.25	$19.66	$22.03	$22.03	$22.03
Lost income from reduced commercial business activity	$0.00	$2.45	$3.03	$2.98	$2.98	$2.98
Lost jobs due to reduced commercial business activity	0	98	122	119	119	119
Lost state and local taxes from reduced commercial business activity	$0.00	$0.38	$0.47	$0.46	$0.46	$0.46
Lost utility revenues	$0.78	$1.76	$2.00	$1.96	$1.96	$1.96
Walker County Rural WSC						
Monetary value of domestic water shortages	$0.00	$0.10	$0.14	$0.14	$0.15	$0.19
Lost utility revenues	$0.00	$0.14	$0.22	$0.22	$0.24	$0.27

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Waller						
Monetary value of domestic water shortages	$0.01	$0.23	$1.69	$3.70	$8.58	$7.99
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.31
Lost jobs due to reduced commercial business activity	0	0	0	0	0	41
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.19
Lost utility revenues	$0.01	$0.30	$0.55	$0.81	$1.11	$1.45
Wallis						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.04	$0.04	$0.06
Lost utility revenues	$0.00	$0.03	$0.05	$0.06	$0.06	$0.07
West Hardin WSC						
Monetary value of domestic water shortages	$0.00	$0.01	$0.03	$0.16	$0.25	$0.42
Lost utility revenues	$0.00	$0.01	$0.03	$0.04	$0.05	$0.07
West Harris County MUD #6						
Monetary value of domestic water shortages	$1.85	$12.81	$15.47	$8.54	$8.42	$8.42
Lost income from reduced commercial business activity	$0.00	$1.00	$1.25	$1.22	$1.20	$1.20
Lost jobs due to reduced commercial business activity	0	40	50	49	48	48
Lost state and local taxes from reduced commercial business activity	$0.00	$0.16	$0.19	$0.19	$0.19	$0.19
Lost utility revenues	$0.33	$0.78	$0.89	$0.87	$0.86	$0.86
West Harris County Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$179.39	$294.01	$329.57	$344.12	$352.42
Lost income from reduced commercial business activity	$0.00	$0.00	$228.89	$271.73	$286.11	$293.75
Lost jobs due to reduced commercial business activity	0	0	5,102	6,057	6,378	6,548
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$24.36	$28.92	$30.45	$31.26
Lost utility revenues	$0.00	$42.61	$63.03	$71.05	$74.30	$76.41
West University Place						
Monetary value of domestic water shortages	$0.49	$0.77	$0.98	$1.32	$1.80	$6.95
Lost utility revenues	$0.78	$1.10	$1.40	$1.68	$2.03	$2.41

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Willis						
Monetary value of domestic water shortages	$0.75	$3.33	$4.25	$4.64	$6.97	$6.42
Lost income from reduced commercial business activity	$0.00	$0.00	$1.07	$0.76	$1.87	$3.18
Lost jobs due to reduced commercial business activity	0	0	34	24	59	100
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.15	$0.11	$0.27	$0.45
Lost utility revenues	$0.24	$0.50	$0.79	$0.80	$1.30	$1.90
Willow Run Subdivision						
Monetary value of domestic water shortages	$2.18	$8.61	$9.96	$9.77	$9.65	$9.65
Lost income from reduced commercial business activity	$0.00	$1.16	$1.42	$1.40	$1.38	$1.38
Lost jobs due to reduced commercial business activity	0	46	57	56	55	55
Lost state and local taxes from reduced commercial business activity	$0.00	$0.18	$0.22	$0.22	$0.21	$0.21
Lost utility revenues	$0.39	$0.90	$1.01	$0.99	$0.98	$0.98
Windfern Forest UD						
Monetary value of domestic water shortages	$0.92	$11.79	$13.88	$13.73	$13.73	$13.73
Lost income from reduced commercial business activity	$0.00	$1.53	$1.94	$1.92	$1.92	$1.92
Lost jobs due to reduced commercial business activity	0	61	78	77	77	77
Lost state and local taxes from reduced commercial business activity	$0.00	$0.24	$0.30	$0.30	$0.30	$0.30
Lost utility revenues	$0.32	$1.20	$1.36	$1.34	$1.34	$1.34
Wood Branch						
Monetary value of domestic water shortages	$0.38	$1.60	$1.83	$2.29	$3.61	$4.54
Lost income from reduced commercial business activity	$0.00	$0.00	$0.30	$0.45	$1.25	$1.67
Lost jobs due to reduced commercial business activity	0	0	9	14	39	53
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.06	$0.18	$0.24
Lost utility revenues	$0.08	$0.17	$0.24	$0.30	$0.38	$0.48
Wood Creek MUN						
Monetary value of domestic water shortages	$2.05	$10.77	$15.55	$19.89	$24.00	$27.83
Lost income from reduced commercial business activity	$0.00	$1.45	$2.22	$2.80	$3.39	$3.98
Lost jobs due to reduced commercial business activity	0	58	89	112	136	160
Lost state and local taxes from reduced commercial business activity	$0.00	$0.22	$0.34	$0.43	$0.53	$0.62
Lost utility revenues	$0.37	$1.13	$1.58	$1.95	$2.32	$2.70

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
The Woodlands						
Monetary value of domestic water shortages	$19.44	$149.15	$162.28	$96.11	$152.29	$206.39
Lost income from reduced commercial business activity	$0.00	$134.57	$152.10	$66.22	$128.96	$175.60
Lost jobs due to reduced commercial business activity	0	1,872	2,115	921	1,794	2,442
Lost state and local taxes from reduced commercial business activity	$0.00	$10.83	$12.24	$5.33	$10.38	$14.14
Lost utility revenues	$6.17	$28.03	$30.73	$22.09	$28.27	$32.92

Contents

List of Tables

List of Figures

Appendices

**This Page
Intentionally Left Blank**

Chapter 5 – Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas

5.1 Scope of Work

This planning effort is part of a consensus-based planning effort to include local concerns in the statewide water supply planning effort. This chapter presents the results of Task 5 of the project scope, which addresses:

- Impacts of Water Management Strategies on Key Parameters of Water Quality
- Evaluation of Third-Party Impacts of Reduced Levels in Water Supply Reservoirs
- Impacts of Moving Water from Rural and Agricultural Areas.

5.2 Impacts of Water Management Strategies on Key Parameters of Water Quality

The potential impacts that water management strategies may have on water quality are discussed in this section, including the identified water quality parameters which are deemed important to the use of the water resources within the region. Under the Clean Water Act, Texas must define designated uses for all major water bodies and, consequently, the water quality standards that are appropriate for that designated water body use. The water quality parameters which are listed for Region H below were selected based on the *TCEQ Water Quality Inventory for Designated Water Body Uses* as well as the water quality parameters identified in the Texas Commission on Environmental Quality (TCEQ) 303d list of impaired water bodies. For reference purposes, *Appendix 5A* contains the TCEQ 303d list of impaired waters within the region and the tabular summaries of use support for the water bodies that are part of Region H.

Key surface water parameters identified within Region H fall into two broad categories:

<u>Nutrients and non-conservative substances:</u>

- Bacteria
- pH
- Dissolved Oxygen
- Total Suspended Solids (TSS)
- Temperature
- Nutrients (Nitrogen, Phosphorus)

<u>Minerals and conservative substances:</u>

- Total Dissolved Solids (TDS)
- Chlorides

- Mercury
- Salinity
- Sediment Contaminants

Non-conservative substances are those parameters that undergo rapid degradation or change as the substance flows downstream, such as nutrients which are consumed by plant life. Nutrient and non-conservative loading to surface water originates from a variety of natural and man-made sources. One significant source of these loads is wastewater treatment facilities. As population increases, the number and size of these wastewater discharges will likely increase as well. Stormwater runoff from certain land use types constitutes another significant source of nutrient loading to the region's watercourses, including agricultural areas, golf courses, residential development, or other landscaped areas where fertilizers are applied. Nutrient loads in Region H are typically within the limits deemed acceptable for conventional water treatment facilities, and are therefore not considered a major concern as related to source of supply.

Conservative substances are those that do not undergo rapid degradation or do not change in water as the substance flows downstream, such as metals. Mineral and other conservative substance loading to surface water generally originates from three sources: (1) non-point source runoff or groundwater seepage from mineralized areas, either natural or man-made (2) wastewater discharges, and (3) sea water migration above estuaries. Region H is fortunate in that the first category is not typical of this area except for the Brazos River which has several natural salt-contributing areas; fortunately, flows in the lower basin generally are sufficient to dilute these sources to easily manageable concentrations. Wastewater discharges, and industrial discharges in particular, have improved over the past 30-years due to the requirements of the Clean Water Act. If local concentrations of conservative contaminants are identified, they are remediated by the appropriate agency. Salinity migration above estuaries is controlled in the Trinity River by the Wallisville Saltwater Barrier, and in the San Jacinto River by the Lake Houston Dam. The 2006 Region H Plan and the 2011 update of the Plan recommends a saltwater barrier be added above the Brazos estuary to protect water quality in that reach of the Brazos River as well. Sediment contaminants can provide particulate matter that can encourage the growth of blue-green algae (cyanobacteria). Sand mining, in particular, has lead to increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels.

Groundwater in Region H is generally of good quality with no usage limitations. Quality parameters of interest include Total Dissolved Solids (TDS), metals and hardness. Portions of the Carrizo-Wilcox aquifer can contain levels of iron that require sequestering or removal through treatment facilities. The Brazos River Alluvium is directly recharged from the based flow in the Brazos River, and has the potential to reflect any contaminant loading of the Brazos River. Portions of the aquifer currently experience elevated TDS and hardness.

Water quality of the Gulf Coast aquifer is generally good throughout the Region. The Chicot and Evangeline aquifers are capable of yielding moderate to large amounts of fresh water in most of the Region. Fresh water is overlain and underlain by saline water in coastal areas and the coastal deposits are not capable of yielding fresh water. Deeper formations throughout the region are able to supply limited freshwater and slightly saline water in updip areas.

Some localized sites within the Region have the potential to cause contamination of the aquifer under adverse conditions. These sites once generated surface water pollution which, if not properly handled, could cause contamination of local soils or shallow groundwater supplies. Except for the northern areas of the Region, the thickness of the near-surface clay soils located over much of the Region provide an effective barrier to deeper aquifer contamination due to normal infiltration. As a consequence, the primary risk for Gulf Coast aquifer groundwater contamination occurs if there are improperly designed or inadequately sealed wells which are exposed to this surface contamination. Localized shallow alluvial aquifers primarily located along the major streams such as the Brazos River are at greater risk for contamination from these sites as a result of the more direct travel paths for potential contaminated water to reach these areas, especially if they are being pumped by small household or livestock wells. At this time, there are no recorded incidents of contaminated groundwater in the Region as a result of these sites.

The water quality parameters and water management strategies selected by the RHWPG were evaluated to determine the impacts on water quality as a result of these recommended strategies. This evaluation used the data available to compare current conditions to future conditions with Region H management strategies in place. The recommended and alternative management strategies, as described in *Chapter 4* of this report and used in this evaluation, are listed below.

Recommended Water Management Strategies

Conservation Strategies:
Industrial Conservation
Irrigation Conservation
Municipal Conservation
Contractual Strategies:
Expand/Increase Current Contracts
New Contracts from Existing Supplies
Reallocation of Existing Supplies
TRA to SJRA Contract
TRA to Houston Contract
WUG-Level Contracts[1]
WWP Contracts
Groundwater Strategies:
Expanded Use of Groundwater
Interim Strategies
New Groundwater Wells for Livestock
Groundwater Reduction Plans:
CHCRWA GRP
COH GRP
City of Missouri City GRP
Fort Bend MUD 25 GRP
Fort Bend WCID 2 GRP
NFBWA GRP[2]
NHCRWA GRP[2]
Pecan Grove GRP
Richmond/Rosenberg GRP
River Plantation GRP
SJRA WRAP[3]
Sugar Land GRP
WHCRWA GRP[2]
Infrastructure Strategies:
CHCRWA Transmission Line
CHCRWA Internal Distribution
CLCND West Chambers System
COH Distribution Expansion
COH Treatment Expansion
Harris County MUD 50 WTP
Huntsville WTP
LLWSSSC Surface Water Project

Luce Bayou Transfer
NFBWA Internal Distribution
NFBWA Shared Transmission Line
NHCRWA Internal 2010 Distribution
NHCRWA Internal 2020 Distribution
NHCRWA Internal 2030 Distribution
NHCRWA Transmission 2010
NHCRWA Transmission 2020
NHCRWA Transmission 2030
Pearland SWTP
Sealy GW Treatment Expansion
WHCRWA Internal Distribution
WHCRWA Transmission Line

Reservoir Strategies:

Allens Creek Reservoir
Brazoria County Off-channel Reservoir
Dow Off-Channel Reservoir
Fort Bend County Off-channel Reservoir
GCWA Off-channel Reservoir

Reuse Strategies:

Fulshear Reuse
Houston Indirect Reuse
Montgomery MUD 8/9 Indirect Reuse
NHCRWA Indirect Reuse
Wastewater Reuse for Industry
Wastewater Reclamation for Mun. Irrigation

Permit Strategies:

BRA System Operations Permit
Houston Bayous Permit

Other Strategies:

Brazoria Co. Interruptible Supplies for Irr.
Freeport Desalination Plant
Brazos Saltwater Barrier

Alternative Water Management Strategies

Montgomery MUD 8/9 Brackish Water Desalination
Sabine to Region H Transfer
Little River Off-channel Reservoir

The following paragraphs discuss the impacts of each management strategy on the chosen water quality parameters.

Increased Groundwater Usage, including Expanded Use of Groundwater, Interim Groundwater, and New Groundwater Wells, is not expected to have significant environmental effects. Groundwater within the Region is generally of good quality and available at the point of use. Increases in well pumping will also contribute to return flows in all river basins in Region H. The return flows will increase in proportion to increased groundwater use and significantly contribute to flows into Galveston Bay. Increased and interim groundwater pumping in the region will continue to be monitored by groundwater regulatory agencies since excessive pumping can lead to land subsidence and exacerbate flooding and drainage problems.

Water Conservation, including municipal, industrial, and agricultural conservation, can have both positive and negative impacts on water quality. Water that is being processed through a wastewater treatment plant typically has acquired additional dissolved solids prior to discharge to the waters of the state. Conventional wastewater treatment reduces suspended solids, but does not reduce dissolved solids in the effluent. Water conservation measures will reduce the volume of water passing through the wastewater plants without reducing the mass loading rates (a 1.6 gallon flush carries the same waste mass to the plant that a 6-gallon flush once carried). This may result in slightly increased conservative contaminant loads in the stream. However, it should be noted that during low flow conditions, the wastewater effluent in a stream may represent water that helps to augment and maintain the minimum stream flows. Tail water is the term used to describe that water returned to the stream after application to irrigated cropland. Tail water carries nutrients, sediments, salts, and other pollutants from the farmland. This return flow can have a negative impact on water quality, and by implementing conservation measures which reduce tail water losses, the nutrient and sediment loading can be reduced. Once again, however, this return flow tends to be introduced into the receiving stream during normally dry periods so it may have a net beneficial effect in terms of maintaining minimum stream flow conditions. Furthermore, the loss of the return flows could be offset by a reduction in irrigation diversions resulting in no net affect on the stream flow.

BRA System Operations strategy potentially impacts the water quality in the lower basin depending on the actual diversion quantities and diversion locations. The BRA will develop a management plan for implementing its System Operations Permit. The management plan will address actual operations under the System Operations Permit, including water quality considerations. Decreased instream flows directly influence saltwater intrusion, which may be mitigated by a saltwater barrier. However, in the “Report in Support of System Operation Permit Application” prepared by Freese and Nichols, Inc. for the BRA, it is stated that system operations would not negatively impact instream flows and may increase the frequency of meeting instream criteria in many locations. Because many of the existing impaired segments within the Brazos Basin are located above system reservoirs, it was also found that the hydrology of these segments will not be significantly impacted by the BRA System Operations.

Although the maximum diversions anticipated under the system operations conditions may pose some slight impact on estuary conditions, the frequency of occurrence for these actual diversions is very low. Additionally, since the Brazos River empties directly into the Gulf of Mexico, operational changes will not affect a large bay system but may impact flows into the Brazos River Estuary and the Columbia Bottomlands. Changes to flow patterns will likely be localized and fall within historical parameters. In conclusion, the BRA’s analysis recognized the System Operations Permit to be more environmentally sensitive than other potential strategies including new reservoir construction, groundwater resource development, and importing water supplies from outside the basin.

The Brazos Saltwater Barrier would help maintain water quality in the lower Brazos basin during low flow periods. Currently, during low flow periods the Dow Chemical and Brazosport Water Authority lower intakes are compromised due to saltwater intrusion. Increased use of Brazos River supplies will extend this seasonal condition upstream unless a barrier or other control measure is implemented.

Freeport Desalination does not affect other water management strategies and affects only the salinity levels in the area of discharge. The discharge water will blend with and be diluted by other water before flowing into the Brazos River above the Intracoastal Waterway. The diversion of Brazos River water to supplement seawater supplies to the desalination plant would maximize the operational efficiency, but could increase the salinity of the Brazos River Estuary, depending upon the size and season of the diversion.

Allens Creek Reservoir, Brazoria County Off-channel Reservoir, Fort Bend County Off-channel Reservoir, Dow Off-channel Reservoir and GCWA Off-channel Reservoir will modify downstream flow regimes, but potentially have positive impacts on water quality. The impacts will be investigated further once a flow regime is developed for the Brazos River. These off-channel reservoirs will be operated as "scalping reservoirs". During times of high flow, water quality in the Brazos River is often poor in terms of suspended solids due to increased sediment loads. At the same time, that water is of better quality in terms of dissolved solids concentrations since the salt being introduced into the Brazos in its upper reaches is diluted. The water that is diverted and stored in reservoirs would allow sediments to settle and accordingly water released from the reservoir would potentially have less sediment concentration. However, reduced sediment loads may have negative impacts on habitats relying on sediments downstream of the proposed reservoirs. Nutrients such as nitrogen and phosphorous are often attached to fine sediment particles that settle in reservoirs reducing nutrient loads to downstream aquatic species. Water that is released from the reservoirs during low flow conditions would have a beneficial effect by diluting the low flow salt concentration in the river. The GCWA Off-channel Reservoir is not expected to create any new water quality issues. The reservoir will allow the GCWA to use supplies from existing water right permits more efficiently.

New Contracts from Existing Supplies, including Expand/Increase Current Contracts, Reallocation of Existing Supplies, CLCND West Chambers System, Brazoria County Interruptible Irrigation, the TRA to Houston Contract, the TRA to SJRA Contract, and Groundwater Reduction Plans (GRPs) are not expected to create any new water quality issues. Fully utilizing existing water supplies may amplify some existing concerns, particularly contaminant concentrations due to reduced opportunities for in-stream dilution. The continued return of flows via wastewater treatment facility discharges will provide some mitigation of that effect. Typical municipal return flows are 60 percent of the total quantity diverted for use.

The Luce Bayou Interbasin Transfer will potentially improve the quality of Lake Houston, due to the blending with water from the Trinity River. However, recent studies performed by the Luce Bayou program have not indicated that this will be the case. Transfers such as this allow an increased opportunity for invasive species migration from the source to receiving waters. Additionally, the transfer will potentially reduce flow in the Trinity River below Dayton, because the Lake Livingston water rights are not fully utilized today. The effects of this reduced flow in the Trinity are mitigated by the existence of the Wallisville Saltwater Barrier at the mouth of the river, which maintains a minimum river level for navigation and prevents the migration of brackish water upstream.

Wastewater Reuse by Houston, NHCRWA and Fort Bend MUD 25, Montgomery County MUDs 8&9, Wastewater Reuse for Industry, and reuse strategies implemented as part of a Groundwater Reduction Plan (GRP) will potentially reduce in-stream flows, thus concentrating any in-stream contaminants. However, the reuse process should remove a portion of the waste load discharged from these facilities, either through the secondary treatment process or simply by the rerouting of effluent. A concern for this strategy would be the disposal method for any liquid wastes from the secondary treatment. In the case of industrial reuse, the reverse-osmosis discharge water would be injected into the bottom of the Houston Ship Channel, into an already brackish zone. The Houston Ship Channel is dredged to a depth of 45-feet (five times the depth of Galveston Bay) with fresh water flowing to the bay at the top and salt water returning on the tides at the bottom. The reverse-osmosis discharge and resultant mixing would be in the salt water layer at the bottom of this channel, increasing the salinity in the brackish zone. Further investigation will be required to determine the full environmental impacts of the reverse osmosis discharge. This reuse is not projected to occur until a time when the overall water use of the region has increased. Wastewater return flows will increase proportionally, so that the reuse of this portion will not constitute a significant reduction below current return flows.

Infrastructure and transmission line expansions including the COH infrastructure expansion, CHCRWA, NFBWA, NHCRWA, and WHCRWA transmission lines, SJRA WRAP and Water Treatment Plant strategies for Pearland, Huntsville, Harris County MUD #50, Sealy and the Lake Livingston Water Supply and Sewer Service Company (LLWSSSC) are not expected to create any new water quality issues. The water management strategies are associated with the transmission of existing supplies to new and increased contractual demands of each wholesale water provider.

The Houston Bayous Permit has the potential to reduce instream flows. The requested diversions from the Houston Bayous Permit account for 20% to 40% of the average flow in Sims, Brays, and Buffalo bayous and 40% to 70% of the average flow in White Oak Bayou. The location of the diversion facilities will also have to be located and any wetland mitigation considered appropriately.

The Sabine to Region H Transfer has the potential to introduce Neches and Sabine River water into the Trinity, San Jacinto, San Jacinto - Brazos, and Brazos basins. This strategy therefore has the potential to result in changes in water chemistry, temperature, nutrients, organic particulates, and sediment in the Neches and Trinity basins. Instream flows in the lower Sabine River will also be reduced by the additional diversion of water from the Sabine River basin. Instream flows in portions of the Neches, Trinity, and San Jacinto Rivers will increase slightly. This strategy is included in the 2011 Plan as an alternative to off-channel reservoirs in Brazoria and Fort Bend Counties. Water transferred from the Sabine to the San Jacinto basin will be used to meet demands primarily in the Brazos and San Jacinto – Brazos basins. This may be accomplished by using the imported water in lieu of Trinity water from Lake Livingston to meet demands in Harris County. Additional infrastructure would be required to convey water from the San Jacinto basin to meet demands in the Brazos and San Jacinto – Brazos basins.

Montgomery County MUD 8/9 Brackish Water Desalination will not affect other water management strategies, but only the salinity in the area of the discharge. The location of the brine disposal will have to be investigated further to determine the impacts of brine concentrate effluent on the receiving surface water or groundwater.

5.3 Evaluation of Third-Party Impacts of Reduced Levels in Water Supply Reservoirs

One of the distinguishing characteristics of Region H is the abundance of recreational opportunities that enrich the quality of life of its residents. (See *Chapter 3* for a discussion of recreational water uses.) Recreation also contributes to attracting tourists and tourist dollars to the region. Some of these recreational activities are associated with water, both freshwater and salt water, and may be sensitive to water supply. The relation to water supply translates through impacts on reservoir levels, instream flows, bay and estuary inflows, water quality, habitat and aesthetics. *Table 5-1* lists recreational activities in Region H and the ways in which those activities are sensitive to water supply.

Although the major reservoirs in Region H were built and are maintained for municipal and industrial water supply, their existence has spurred the development of recreation related economic activity around their perimeters. In addition, this recreation-oriented development expands the tax base of local jurisdictions located near the reservoirs. Other water bodies similarly provide economic opportunities in recreation support activities.

Table 5-1

Recreational Activities Associated with Water in Region H

Activity	Major Sensitivity to Supply
Boating: (Canoe/kayak, sailboats, personal watercraft, power boats)	Reservoir level Instream flow Aesthetics
Swimming	Aesthetics Water quality Reservoir level Instream flow
Fishing	Reservoir level Instream flow Bay & Estuary inflows

	Water quality Habitat
Hunting	Habitat Instream flow
Parks: (Camping, hiking, biking, horseback riding)	Aesthetics Habitat Instream flow
Nature Tourism	Reservoir level Instream flow Bay & Estuary inflows Habitat Aesthetics
Golfing	Course upkeep Aesthetics

These activities impact the economy of the region through many paths, some of which are captured under the heading of "commercial activities" in the municipal water user group (WUG) in the socioeconomic analysis of water shortages (discussed in *Chapter 4*). Examples of these would be the sale of boating equipment, pier use fees collected by a convenience store or hotel receipts. Others impacts are not accounted for among the WUGs.

The determination of a direct relationship between water management strategies and recreational opportunities and indirect economic impacts is not feasible, due to the numerous other factors that affect recreational economics (i.e., weather conditions, national economic conditions, travel restrictions, etc.). However, the collective affects of strategies on anticipated lake levels during historical meteorological conditions were analyzed and some conclusions may be inferred on the impacts to recreation and economics.

For this analysis, the TCEQ Water Availability Model was updated to include the water management strategies recommended by Region C and Region H in their 2006 Regional Water Plans. The tributaries to Galveston Bay were then modeled under four scenarios to compare the results with and without the recommended strategies. The scenarios used were Run 8 “Current Conditions” (current levels of water diversions and return flows), Run 1 (full use of water rights with current percentage of return flows), Run 3 (full use of water rights with no return flows) and a future condition (full use of water rights, new strategies in place, and full return flows except for recommended reuse strategies). The first three models used the year 2000 reservoir sedimentation conditions to represent the 2010 condition, and the fourth used the 2060 condition. The future sedimentation condition benefits downstream projects, because upper basin projects have less capacity to store available flows. In this case, Lakes Houston and Livingston may be considered downstream projects.

The results of these simulations are summarized in *Table 5-2*. Reservoir elevations, capacities and surface areas are shown in *Figure 5-1*, *Figure 5-2* and *Figure 5-3* as a reference. *Appendix 5B* contains figures graphically displaying the model outputs and the percentile comparisons. Percentile values indicate the percentage of time the result value is less than or equal to the subject value. Therefore, the maximum value is the full lake elevation, the median value is the lake level in 50% of the monthly outputs, and the minimum value is the lowest monthly elevation in the simulation. Because the yield of these water supply reservoirs is based upon full use of the stored water during the drought of record, the Run 3 minimum elevation is, by definition, the lake bottom elevation. Note that this value is greater in the 2060 conditions simulation due to the projected accumulation of sediments on the reservoir floor. Each simulation run used the same 57-year inflow data set, which includes the drought of record period.

Table 5-2

Lake Level Percentile Tables

Lake Conroe Water Surface Elevations

	Current Conditions	Yr 2010 Run 1	Yr 2010 Run 3	Yr 2060 w/ Strategies
Maximum	201.0	201.0	201.0	201.0
90th	201.0	201.0	201.0	201.0
75th	201.0	200.5	200.5	200.5
Median	200.5	198.4	198.2	198.5
25th	198.6	193.6	193.0	194.2
10th	195.3	184.2	183.1	185.9
Minimum	187.8	145.0	145.0	152.0

Lake Houston Water Surface Elevations

	Current Conditions	Yr 2010 Run 1	Yr 2010 Run 3	Yr 2060 w/ Strategies
Maximum	44.0	44.0	44.0	44.0
90th	44.0	44.0	44.0	44.0
75th	44.0	44.0	44.0	44.0
Median	44.0	44.0	44.0	44.0
25th	43.3	43.3	42.8	44.0
10th	42.0	42.0	40.4	43.8
Minimum	32.8	32.8	9.0	40.3

Lake Livingston Water Surface Elevations

	Current Conditions	Yr 2010 Run 1	Yr 2010 Run 3	Yr 2060 w/ Strategies
Maximum	131.0	131.0	131.0	131.0
90th	131.0	131.0	131.0	131.0
75th	131.0	131.0	131.0	131.0
Median	131.0	131.0	129.8	131.0
25th	130.5	130.4	124.3	129.5
10th	129.0	128.0	116.5	127.1
Minimum	125.5	114.0	60.0	120.7

As can be seen from *Table* 5-2, under current conditions Lake Conroe would have a 13.2-ft elevation variation range during the historical period, Lake Houston an 11.2-ft range and Lake Livingston a 5.5-ft range. In all cases, the lakes are essentially full more than 50% of the time. To compare the runs with and without management strategies, it is best to compare Run 1 with the Recommended Strategies simulation, because both models use expected return flows.

Figure 5-1

Lake Conroe Surface Area and Capacity (2060 Conditions)

Surface Elevation	Surface Area	Storage Volume	Percent Fill
Feet (msl)	Acres	Acre-Feet	%
201	19,360	377,560	100%
195.5	15,600	283,170	75%
188.7	12,190	188,780	50%
179.5	8,500	94,390	25%
152			Bottom

Figure 5-2

Lake Houston Surface Area and Capacity (2060 Conditions)

Surface Elevation	Surface Area	Storage Volume	Percent Fill
Feet (msl)	Acres	Acre-Feet	%
44	11,850	106,410	100%
41.5	9,250	79,810	75%
38.0	7,780	53,210	50%
33.4	5,700	26,600	25%
20			Bottom

Figure 5-3

Lake Livingston Surface Area and Capacity (2060 Conditions)

Surface Elevation	Surface Area	Storage Volume	Percent Fill
Feet (msl)	Acres	Acre-Feet	%
131	82,920	1,717,080	100%
125.4	70,600	1,287,810	75%
118.6	56,920	858,540	50%
109.8	39,510	429,270	25%
63			Bottom

For Lake Conroe, full use of water rights reduces the frequency of the lake being full from 50% to 25% of the time in every simulation. The lake level falls below the current conditions minimum elevation between 10 and 25 percent of the time. The transfer of water to Lake Houston via Luce Bayou slightly increases the levels in Lake Conroe, but otherwise the two models are about the same.

For Lake Houston, the full use of water rights does not significantly change the lake level frequencies. This is mainly due to the fact that Lake Houston is senior in priority date to Lake Conroe, and therefore the model always stores available flows in Lake Houston first, and then makes the remainder available to Lake Conroe. In actual operation, a better balance is maintained between the two, but Lake Conroe will always decline faster than Lake Houston because it is supplied from a smaller watershed. Of note in the future condition simulation is that the import of water through Lake Houston via the Luce Bayou transfer increased the frequency of the lake being full from 50% to 90% of the time.

Finally, the Lake Livingston results show how dependent the reservoir is upon return flows from upstream (Run 3 condition). Under the recommended strategies run, the results are very close to the current conditions simulation. This is because increased use in the upper Trinity Basin is off-set by increased import of out-of-basin supplies. Region H indirectly benefits from the growth of the Dallas-Fort Worth Metroplex. In the current round of planning, Region C is increasing the amount of recommended reuse, although it is not expected they will reach the full-reuse condition modeled in Run 3.

The drought of record lasted six years, and subsequent droughts have exceeded two years in duration. Looking at the simulation results in *Figures 5B-1* and *5B-5*, it can be seen that when significant declines in lake levels occur, they will not be instantaneous events, but will be a subset of the overall drought period. Anecdotally, a month with low lake levels will impact a land owner’s ability to use a dock. A year with low lake levels may impact his property rental or resale value. Similar inferences may be made as to the impacts on lake area communities and businesses.

Reduced lake levels will also impact water quality. During extreme low flow periods, reduced residence time in the reservoir will lessen the beneficial effects of sediment settling. Because the climate in this area is mild, the seasonal turn-over in lakes occurs less frequently than in colder climates. When reservoirs are drawn down, the denser lower layer of water will be tapped, which may increase the level of treatment required for use.

An option to mitigate these affects is to establish a minimum storage pool for a given reservoir, and prohibit withdrawals below that level. Because that would reduce the available storage pool for these reservoirs, and thus reduce the yield, such an imposition would constitute a taking of property. As a practical matter, the establishment of a minimum storage pool (for habitat, recreation, or other uses) would need to be off-set by the development of a new source of water supply, equal in yield to that lost from the lake. Development of this additional supply would be costly, and was not considered under this plan.

5.4 Impacts of Moving Water from Rural and Agricultural Areas

Currently, the water used in rural (livestock) and agricultural areas represent 13% of the total water used in Region H, a decline from 22% estimated in the year 2000. It is estimated that this will be reduced to 12% of the Region’s 3,525,100 acre-feet demand projected in year 2060, mainly due to the growth of municipal and industrial demands. There is a slight projected decrease in irrigation (from 450,175 acre-feet per year in 2010 to 430,930 acre-feet per year in 2060, or a net reduction of 4%). Livestock demand is constant over the planning period. Water management strategies, along with current sources of reliable water supply and interruptible supplies, are available to agricultural users throughout the planning period; therefore, the impacts on agricultural users are not directly related to moving water from these areas.

The potential impacts of moving water from rural and agricultural areas are mainly associated with socio-economic impacts to third parties. The potential impetus for moving water is expected to occur from two sources: 1) the cost of raw water may become too great for the local irrigator to afford, and he may elect to voluntarily leave the industry for economic reasons; or 2) the value of the raw water for municipal or industrial purposes may create a market for the wholesale owner to re-direct the sale of the water making it unavailable to the irrigator. In some cases, it may be feasible for a third party to pay for conservation measures and then utilize the saved water for their own needs (through re-contracting or other agreements) and allow the irrigator to remain in business; however, there are few contractual and institutional measures in effect to allow this trade-off to occur at this time. The intent of this plan is to provide water or the conservation means to meet all projected water demands throughout the planning period.

Appendix 5A

Texas Commission on Environmental Quality 303(d)
List of Impaired Waters

This Page Intentionally
Left Blank

APPENDIX 5A

Te as Commission on Environmental Quality
303(d)
List of Impaired Waters

T is Page Intentionally
Left Blan

2008 Texas 303(d) List (March 19, 2008)

As required under Sections 303(d) and 304(a) of the federal Clean Water Act, this list identifies the water bodies in or bordering Texas for which effluent limitations are not stringent enough to implement water quality standards, and for which the associated pollutants are suitable for measurement by maximum daily load.

In addition, the TCEQ also develops a schedule identifying Total Maximum Daily Loads (TMDLs) that will be initiated in the next two years for priority impaired waters. Issuance of permits to discharge into 303(d)-listed water bodies is described in the TCEQ regulatory guidance document *Procedures to Implement the Texas Surface Water Quality Standards* (August 2002, RG-194).

Impairments are limited to the geographic area described by the Assessment Unit and identified with a six or seven-digit AU_ID. A TMDL for each impaired parameter will be developed to allocate pollutant loads from contributing sources that affect the parameter of concern in each Assessment Unit. The TMDL will be identified and counted using a four or five-digit SegID. Water Quality permits that are issued before a TMDL is approved will not increase pollutant loading that would contribute to the impairment identified for the Assessment Unit.

Information Provided

SegID and Name: The unique identifier (SegID), segment name, and location of the water body. The SegID may be one of two types of numbers. The first type is a classified segment number (4 digits, *e.g.*, 0218), as defined in Appendix A of the Texas Surface Water Quality Standards (TSWQS). The second type (five digits, e.g., 0218A) is a partially classified water body described in Appendix D of the TSWQS, or an unclassified water body, not defined in the TSWQS, though associated with a classified water body because it is in the same watershed. The segment name and description immediately follow SegID.

Area: Identifies the assessment unit (AU_ID, six or seven digits, *e.g.*, 0101A_01) and describes the location of the specific area in which one or more water quality standards are not met.

Parameter(s): Pollutants or water quality conditions that assessment procedures indicate do not meet assigned water quality standards.

Category: In the 2008 Assessment, one of three subcategories was assigned to each impaired parameter to provide information about water quality status and management activities on that water body. The categories are defined below:

Category 5: The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
- *Category 5a* - A TMDL is underway, scheduled, or will be scheduled.
- *Category 5b* - A review of the water quality standards for this water body will be conducted before a TMDL is scheduled.
- *Category 5c* - Additional data and information will be collected before a TMDL is scheduled.

Year First Listed: The assessment year the pollutant or water quality condition in this water body initially did not meet water quality standards as indicated in any of the areas assessed (AU_IDs).

[redacted]

Area		Category	Year First Listed
0615A_01	*Lower 9 miles* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0701_01	*From saltwater lock to 8 miles upstream* depressed dissolved oxygen	5a	1996
0701_02	*from 8 miles upstream of saltwater lock to the confluence of N and S Forks Taylor Bayou* depressed dissolved oxygen	5a	1996

[redacted]

Area		Category	Year First Listed
0701D_01	*Entire water body* depressed dissolved oxygen	5a	2004

[redacted]

Area		Category	Year First Listed
0702A_02	*Lower portion from SH82 to its confluence with Taylor Bayou*		
	impaired fish community	5c	2002
	toxicity in sediment	5c	1998
0702A_03	*Upper portion from its headwaters at the Port Arthur Canal to SH82*		
	toxicity in water	5c	1998
0702A_04	*Drainage canal leading into Alligator Bayou approx. 0.8 miles north of SH82*		
	toxicity in water	5c	1998

[redacted]

Area		Category	Year First Listed
0704_02	*From confluence with Bayou Din to upper end of segment*		
	depressed dissolved oxygen	5a	1998

[redacted]

Area		Category	Year First Listed
0801C_01	*Upper half of bayou*		
	depressed dissolved oxygen	5b	2006

[redacted]

Area		Category	Year First Listed
0803_01	*Lowermost portion of reservoir, adjacent to dam*		
	pH	5c	2008
	sulfate	5c	2006
0803_02	*Lower portion of reservoir, East Wolf Creek*		
	sulfate	5c	2006
0803_03	*Lower portion of reservoir, East Willow Springs*		
	sulfate	5c	2006
0803_04	*Middle portion of reservoir, East Pointblank*		
	sulfate	5c	2006
0803_05	*Middle portion of reservoir, downstream of Kickapoo Creek*		
	sulfate	5c	2006
0803_06	*Middle portion of reservoir, centering on US 190*		
	pH	5c	2008
	sulfate	5c	2006
0803_07	*Upper portion of reservoir, west of Carlisle*		
	sulfate	5c	2006
0803_08	*Cove off upper portion of reservoir, East Trinity*		
	sulfate	5c	2006
0803_09	*West Carolina Creek cove, off upper portion of reservoir*		
	sulfate	5c	2006
0803_10	*Upper portion of reservoir, centering on SH 19*		
	sulfate	5c	2006
0803_11	*Riverine portion of reservoir, centering on SH 21*		
	sulfate	5c	2006
0803_12	*Remainder of reservoir*		
	sulfate	5c	2006

[redacted]

Area		Category	Year First Listed
0804G_01	*Entire Segment*		
	depressed dissolved oxygen	5c	2006
	impaired macrobenthic community	5c	2006

[redacted]

Area		Category	Year First Listed
0805_01	*25 mile reach near FM 85*		
	PCBs in edible tissue	5a	2002
0805_02	*25 mile reach near SH 34*		
	PCBs in edible tissue	5a	2002
0805_03	*11 mile reach near S. Loop 12*		
	bacteria	5a	1996
	PCBs in edible tissue	5a	2002
0805_04	*Upper 8 miles*		
	bacteria	5a	1996
	PCBs in edible tissue	5a	2002
0805_05	*Remainder of segment*		
	PCBs in edible tissue	5a	2002
0805_06	*From 15.57 mi. upstream of SH 34 to 4.71 mi. downstream of S Loop 12*		
	PCBs in edible tissue	5a	2002

[redacted]

Area		Category	Year First Listed
0806_01	*Lower 22 miles of the segment*		
	PCBs in edible tissue	5a	1996

[redacted]

Area		Category	Year First Listed
0806D_01	*Marine Creek from the confluence with W. Fork Trinity River 2 miles upstream to Tenmile Bridge Rd. in Ft. Worth*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0806E_01	*Five mile stretch of Sycamore Creek running upstream from confluence with the W. Fork of Trinity River to confluence with Echo Lake Tributary in Fort Worth*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0810_01	*Lower 25 miles of segment*		
	bacteria	5a	1998

[redacted]

Area		Category	Year First Listed
0810A_01	*Fifteen mile stretch of Big Sandy Creek running from confluence with Waggoner Creek to FM 1810 West of Alvord, Wise Co.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0810B_01	*Eighteen mile stretch of Garrett Creek running upstream from confluence with Salt Creek to Wise County Road approximately 14 miles upstream of SH114, Wise Co.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0810C_01	*Eight mile stretch of Martin Branch running upstream from confluence with Center Creek to FM 730 south of Decatur, Wise County.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0810D_01	*Eleven mile stretch of Salt Creek running upstream from confluence with Garrett Creek, Wise County.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0812_01	*Lower 25 miles of segment*		
	chloride	5b	1998
	depressed dissolved oxygen	5b	1998
	total dissolved solids	5b	1998
0812_02	*Upper 60 miles of segment*		
	total dissolved solids	5b	1998
	chloride	5b	1998

[redacted]

Area		Category	Year First Listed
0818_01	*1674*		
	pH	5c	2002
0818_02	*Caney Creek cove*		
	pH	5c	2002
0818_03	*Clear Creek cove*		
	pH	5c	2002
0818_04	*Lower portion of reservoir east of Key Ranch Estates*		
	pH	5c	2002
0818_05	*Cove off lower portion of reservoir adjacent to Clearview Estates*		
	pH	5c	2002
0818_06	*Middle portion of reservoir downstream of Twin Creeks cove*		
	pH	5c	2002
0818_07	*Twin Creeks cove*		
	pH	5c	2002
0818_08	*Prairie Creek cove*		
	pH	5c	2002
0818_09	*Upper portion of reservoir adjacent to Lacy Fork cove*		
	pH	5c	2002
0818_11	*Upper portion of reservoir east of Tolosa*		
	pH	5c	2002
0818_12	*Uppermost portion of reservoir downstream of Kings Creek*		
	pH	5c	2002

[redacted]

Area		Category	Year First Listed
0819_01	*Entire segment*		
	sulfate	5b	2008
	total dissolved solids	5b	2008
	chloride	5b	2008

[redacted]

Area		Category	Year First Listed
0820C_01	*Entire creek* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
0822_02	*4.5 miles upstream to 7.5 miles downstream DWU intake* bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0822A_02	*A 3. 5 mile stretch of Cottonwood Branch running upstream from approximately 0.5 miles downstream of N. Story Rd. to Valley View Rd, Dallas, Co.* bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0822B_01	*A 5.5 mile stretch of Grapevine Creek running upstream from Coppell Rd. in Coppell, Dallas Co., to approximately 1. 5 miles upstream of SH 21, Tarrant County.* bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0829_01	*Lower mile of segment* PCBs in edible tissue	5a	1996

[redacted]

Area		Category	Year First Listed
0831_04	*2 mi upstream of South Fork Trinity River confluence to Squaw Ck. Confluence* depressed dissolved oxygen	5b	1996
0831_05	*From the confluence of Squaw Ck. to Lake Weatherford Dam* depressed dissolved oxygen	5b	1996

[redacted]

Area		Category	Year First Listed
0833_02	*Upper 11 miles of segment* depressed dissolved oxygen	5b	1998
0833_03	*From the confluence of McKnight Branch to the confluence of Cottonwood Ck.* depressed dissolved oxygen	5b	1998
0833_04	*From the confluence with Dobbs Branch to confluence with McKnight Branch* depressed dissolved oxygen	5b	1998

[redacted]

Area		Category	Year First Listed
0838C_01	*Entire segment.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841_01	*Lower 14 miles of segment*		
	bacteria	5a	1996
	PCBs in edible tissue	5a	1996
0841_02	*Upper 13 miles of segment*		
	PCBs in edible tissue	5a	1996

[redacted]

Area		Category	Year First Listed
0841B_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841C_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841D_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841E_01	*Entire segment.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841F_01	*Entire segment.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841G_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841H_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841J_01	*Entire segment.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
0841K_01	*Entire segment.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841M_01	*Entire segment.*		
	bacteria	5a	2006

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
0841N_01	*Entire segment*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841S_01	*A 5 acre area in NW corner of Vilbig Lakes, near confluence with unnamed creek, approx. 100 m south of intersection of Rusdell Rd./Marvel Dr. in Irving, Dallas, Co.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0841U_01	*A 4 mile stretch of West Irving Branch running upstream from approx. 0.4 mi. downstream of Oakdale Rd. to just south of Sowers Road in Irving, Dallas Co.*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0901_01	*Entire segment*		
	dioxin in edible tissue	5a	2002
	PCBs in edible tissue	5a	2008
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
0902_01	*Entire segment*		
	impaired macrobenthic community	5c	2006

[redacted]

Area		Category	Year First Listed
1001_01	*From Lake Houston Dam to US Hwy 90*		
	dioxin in edible tissue	5a	2000
1001_02	*From US Hwy 90 to IH 10*		
	dioxin in edible tissue	5a	2000
	PCBs in edible tissue	5a	2002

[redacted]

Area		Category	Year First Listed
1002_06	*Confluence with Spring Creek to West Lake Houston Pkwy*		
	bacteria	5a	2006

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1003_01	*Confluence with Caney Creek upstream to US 59*		
	bacteria	5a	2006
1003_02	*US Hwy 59 to 25 miles upstream (just upstream of Clear Creek confluence)*		
	bacteria	5a	2006
1003_03	*25 miles upstream of US 59 to US 190 (upper segment boundary)*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1004_02	*IH 45 to the Spring Creek confluence*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1004D_01	*Confluence with West Fork San Jacinto River upstream to confluence of the East and West Forks of Crystal Creek*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1004E_02	*From Airport Rd to confluence with West Fork San Jacinto River*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1005_01	*Downstream I-10 to Lynchburg Ferry Road*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1005_02	*Lynchburg Ferry Road to Goose Island*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
	bacteria	5c	2006
1005_03	*Goose Island to SH 146*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1005_04	*SH 146 to Morgans Point*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002

[redacted]

Area		Category	Year First Listed
1006_01	*Houston Ship Channel Tidal-Greens Bayou confluence to Patrick Bayou confluence*		
	dioxin in edible tissue	5a	1996
	bacteria	5c	2006
	PCBs in edible tissue	5a	2002
1006_02	*Houston Ship Channel Tidal- Patrick Bayou confluence to lower segment boundary*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1006_03	*Greens Bayou Tidal*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1006_04	*Patrick Bayou Tidal*		
	dioxin in edible tissue	5a	1996
	mercury in water	5a	1998
	PCBs in edible tissue	5a	2002
	toxicity in sediment	5c	2000
1006_05	*Goodyear Creek Tidal*		
	bacteria	5c	2006
	depressed dissolved oxygen	5c	2006
	PCBs in edible tissue	5a	2002
	dioxin in edible tissue	5a	1996

[redacted]

Area		Category	Year First Listed
1006D_01	*From the confluence with Greens Bayou to US 59*		
	bacteria	5a	2002
1006D_02	*From Hirsch Road to Homestead Road*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1006F_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1006H_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1006I_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1006J_01	*Entire water body*		
	bacteria	5a	2002

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1007_01	*Houston Ship Channel/Buffalo Bayou Tidal*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
	bacteria	5c	2006
1007_02	*Sims Bayou Tidal (upstream of SH 35 to Houston Ship Channel confluence)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1007_03	*Hunting Bayou Tidal (I-10 to confluence with Houston Ship Channel)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1007_04	*Brays Bayou Tidal (downstream of I 45 to confluence with the Houston Ship Channel)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1007_05	*Vince Bayou Tidal (SH 225 to confluence with the Houston Ship Channel*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
	bacteria	5c	2006
	toxicity in sediment	5c	2000
1007_06	*Berry Bayou Tidal (2.4 km upstream of the Sims Bayou confluence)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
1007_07	*Buffalo Bayou (US 59 to upstream of 69th Street WWTP)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002
	bacteria	5c	2006
1007_08	*Little Vince Bayou Tidal (From confluence with Vince Bayou to SH 225)*		
	dioxin in edible tissue	5a	1996
	PCBs in edible tissue	5a	2002

[redacted]

Area		Category	Year First Listed
1007A_01	*From confluence with an unnamed flood control ditch near Corsair St to the confluence with Sims Bayou* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1007B_01	*From 11.5km upstream of confluence with Brays Bayou Tidal to SH 6* bacteria	5a	2002
1007B_02	*SH 6 to Clodine Road* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007C_01	*From Harris County line to confluence with Brays Bayou* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007D_01	*From 0.4 miles north of Beltway 8 to Hiram Clark* bacteria	5a	2002
1007D_02	*From Hirman Clark to 11 miles upstream of the confluence with the Houston Ship Channel* bacteria	5a	2002
1007D_03	*From 11 miles upstream of the Houston Ship Channel confluence to SH 35* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007E_01	*Entire water body* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007F_01	*1.5 miles upstream from confluence with Sims Bayou to SH 3* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007G_01	*Entire water body* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007H_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007I_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007K_01	*From just downstream of South Lockwood Drive to the confluence with Brays Bayou*		
	depressed dissolved oxygen	5c	2002
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007L_01	*Entire perennial portion of water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007M_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007N_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1007O_01	*Entire water body*		
	bacteria	5a	2002
	depressed dissolved oxygen	5c	2002

[redacted]

Area		Category	Year First Listed
1007R_01	*From Bain Street to Sayers Street (South Fork)*		
	bacteria	5a	2002
	depressed dissolved oxygen	5c	2002
1007R_02	*From just east of Elysian Street to Falls Street (North Fork)*		
	bacteria	5a	2002
1007R_03	*From Falls Street to Loop 610 East*		
	bacteria	5a	2002
1007R_04	*From Loop 610 East to IH 10*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1008_02	*Field Store Road to SH 249*		
	bacteria	5a	1996
	depressed dissolved oxygen	5b	1996
1008_03	*SH 249 to IH 45*		
	bacteria	5a	1996
1008_04	*IH 45 to confluence with Lake Houston*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1008B_01	*From Old Conroe Road to the confluence with Bear Branch*		
	bacteria	5a	2006

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1008H_01	*Entire water body*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1009_01	*Upper portion of segment to downstream of US 290*		
	bacteria	5a	1996
1009_02	*US 290 to SH 249*		
	bacteria	5a	1996
1009_03	*SH 249 to IH 45*		
	bacteria	5a	1996
1009_04	*IH 45 to confluence with Spring Creek*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1009C_01	*From an unnamed lake 0.3 miles southeast of Telge Road to the confluence with Cypress Creek*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1009D_01	*Entire water body*		
	bacteria	5c	2006

Area		Category	Year First Listed
1009E_01	*Entire water body*		
	bacteria	5a	2006

Area		Category	Year First Listed
1010_02	*FM 1097 to SH 105*		
	bacteria	5a	2006
1010_04	*FM 2090 to lower segment boundary*		
	bacteria	5a	2006

Area		Category	Year First Listed
1011_02	*US Hwy 59 to confluence with Caney Creek*		
	bacteria	5a	2006

Area		Category	Year First Listed
1013_01	*Entire segment*		
	bacteria	5a	1996

2008 Texas 303(d) List (March 19, 2008)

Area		Category	Year First Listed
1013A_01	*From the confluence of White Oak Bayou upstream to the RR Tracks north of IH 610*		
	bacteria	5a	2002
	depressed dissolved oxygen	5c	2002

Area		Category	Year First Listed
1013C_01	*Entire water body*		
	bacteria	5a	2002

Area		Category	Year First Listed
1014_01	*Entire segment*		
	bacteria	5a	1996

Area		Category	Year First Listed
1014A_01	*Confluence with South Mayde Creek to a point upstream of an unnamed tributary north of Langenbaugh Road*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1014B_01	*From SH6 to the confluence with Willow Fork Buffalo Bayou*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1014E_01	*Confluence with Bear Creek upstream to the confluence with Dinner Creek*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1014H_01	*From the confluence with Buffalo Bayou upstream to the confluence with an unnamed tributary 0.62 km east of Barker-Cypress Road*		
	bacteria	5a	2002
1014H_02	*From the confluence with an unnamed tributary 0.62 km east of Barker-Cypress Road upstream to an unnamed tributary 1.05 km south of Clay Road*		
	bacteria	5a	2002

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1014K_01	*From the confluence with South Mayde Creek upstream to a point south of Clay Road*		
	bacteria	5a	2002
1014K_02	*From south of Clay Road upstream to north of Tanner Road*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1014L_01	*Confluence with Buffalo Bayou upstream to the channelization south of Franz Rd.*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1014M_01	*Entire water body*		
	depressed dissolved oxygen	5c	2002
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1014N_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1014O_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1016_01	*Upper segment boundary (FM 1960) to IH 45*		
	bacteria	5a	1996
1016_02	*IH 45 to US 59*		
	bacteria	5a	1996
1016_03	*US 59 to lower segment boundary at the Halls Bayou confluence*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1016A_02	*From the confluence with Williams Gully upstream to 1.5 km north of Atascosita Road*		
	bacteria	5a	2002
1016A_03	*From the confluence with Greens Bayou upstream to the confluence with Williams Gully*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1016B_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1016C_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1016D_01	*Entire water body*		
	bacteria	5a	2002
	depressed dissolved oxygen	5c	2002

[redacted]

Area		Category	Year First Listed
1017_01	*Huffsmith Rd to the confluence with Vogel Creek*		
	bacteria	5a	1996
1017_02	*Vogel Creek to the Cole Creek confluence*		
	bacteria	5a	1996
1017_03	*Cole Creek confluence to the Brickhouse Gully confluence*		
	bacteria	5a	1996
1017_04	*Brickhouse Gully confluence to lower segment boundary*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1017A_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1017B_02	*From Flintlock Street to confluence with White Oak Bayou*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1017D_01	*Entire water body*		
	bacteria	5a	2002
	depressed dissolved oxygen	5c	2002

[redacted]

Area		Category	Year First Listed
1017E_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1101_01	*Upper segment boundary to Chigger Creek confluence*		
	bacteria	5a	1996
1101_02	*Chigger Creek confluence to IH 45*		
	bacteria	5a	1996
1101_03	*IH45 to Cow Bayou confluence*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1101B_01	*From the headwaters to FM 528*		
	bacteria	5a	2002
1101B_02	*FM 528 to the confluence with Clear Creek*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1101D_01	*From headwater to Abilene St.*		
	bacteria	5c	2006
1101D_02	*From Abilene St. to confluence with Clear Lake*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1102_01	*Upper segment boundary (Rouen Road) to SH 288*		
	bacteria	5a	1996
1102_02	*SH 288 to Hickory Slough confluence*		
	bacteria	5a	1996
	impaired fish community	5c	2006
1102_03	*Hickory Slough confluence to Turkey Creek confluence*		
	bacteria	5a	1996
1102_04	*Turkey Creek confluence to Mary's Creek confluence*		
	bacteria	5a	1996
1102_05	*Mary's Creek confluence to lower segment boundary*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1102A_01	*Sunset Drive to SH35*		
	bacteria	5a	2002
1102A_02	*Confluence with Clear Creek to Sunset Drive*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1102B_01	*Entire segment*		
	bacteria	5a	2002

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1102C_01	*From confluence with Clear Creek to (approx. 0.3 miles) upstream of CR 93*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1102D_01	*Confluence with Clear Creek to IH 45*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1102E_01	*Beamer Road to confluence with Clear Creek*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1103_01	*From 2.5 miles downstream of FM 517 to the Bordens Gully confluence*		
	bacteria	5a	1996
	depressed dissolved oxygen	5a	1996
1103_02	*From the Bordens Gully confluence to the Benson Bayou confluence*		
	bacteria	5a	1996
	depressed dissolved oxygen	5a	1996
1103_03	*From the Benson Bayou confluence to the confluence with Gum Bayou*		
	bacteria	5a	1996
	depressed dissolved oxygen	5a	1996

[redacted]

Area		Category	Year First Listed
1103A_01	*From confluence with Dickinson Bayou Tidal to 0.37 miles upstream of FM 646*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1103B_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1103C_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1104_01	*From lower segment boundary upstream to FM 517*		
	bacteria	5a	1996
	depressed dissolved oxygen	5c	2006
1104_02	*From FM 517 upstream to FM 528*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1110_02	*4 mi upstream South Texas Water Co. Canal to just above Ramsey Prison Unit*		
	bacteria	5c	2006
1110_03	*From just upstream of Ramsey Prison Unit (Cow Cr) to CR 290/S Walker St.*		
	depressed dissolved oxygen	5b	1996
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1113_01	*Upper segment boundary to confluence with Big Island Slough*		
	depressed dissolved oxygen	5b	1996
1113_02	*Big Island Slough confluence to Horsepen Bayou confluence*		
	depressed dissolved oxygen	5b	1996
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1113A_01	*0.5 miles downstream of Genoa Red Bluff to Preston Road*		
	bacteria	5a	1998
	depressed dissolved oxygen	5c	1998

[redacted]

Area		Category	Year First Listed
1113B_01	*Confluence with Armand Bayou to SH 3*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1202H_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1202J_01	*Upstream portion of water body to Whaley-Longpoint Road*		
	impaired fish community	5b	2006
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1205_01	*Upstream portion of lake*		
	chloride	5c	2008
1205_02	*Portion of lake adjacent to the City of Oak Trail Shores*		
	chloride	5c	2008
1205_03	*Portion of lake adjacent to the City of Granbury*		
	chloride	5c	2008
1205_04	*Portion of lake downstream of Granbury*		
	chloride	5c	2008
1205_05	*Downstream portion of lake*		
	chloride	5c	2008

[redacted]

Area		Category	Year First Listed
1206_01	*Downstream portion of segment*		
	chloride	5b	2006
	impaired macrobenthic community	5c	2008
1206_02	*Middle Portion of Segment*		
	chloride	5b	2006
	impaired macrobenthic community	5c	2008
1206_03	*Upstream portion of segment*		
	chloride	5b	2006

[redacted]

Area		Category	Year First Listed
1208_01	*From confluence with Possum Kingdom upstream to confluence with spring Branch* bacteria	5c	2008
1208_02	*Portion of segment from confluence with Spring Branch upstream to confluence with Fish Creek* bacteria	5c	2008
1208_04	*From confluence with Boggy Creek upstream to confluence with Millers Creek* bacteria	5c	2008
1208_05	*From confluence with Millers Creek upstream to confluence with Lake Creek* bacteria	5c	2008

[redacted]

Area		Category	Year First Listed
1209_02	*From confluence with Rocky Creek to confluence with Sandy Branch* bacteria	5a	2002
1209_03	*From confluence with Sandy Branch to confluence with Shepherd Branch* bacteria	5a	2002
1209_05	*From confluence with Camp Creek to 25 miles upstream* bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1209A_01	*Entire reservoir* toxicity in sediment	5c	1999

[redacted]

Area		Category	Year First Listed
1209B_01	*Entire reservoir* toxicity in sediment	5c	2000

[redacted]

Area		Category	Year First Listed
1209C_01	*Entire water body* bacteria	5a	1999

[redacted]

Area		Category	Year First Listed
1209D_01	*entire water body* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1209E_01	*Entire water body* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1209G_01	*Entire water body* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1209H_01	*From the lower end of the creek to FM 2096* bacteria	5c	2006
1209H_02	*From FM 2096 to Twin Oak Reservoir dam* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1209I_01	*From lower end to confluence with Dry Creek* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1209J_01	*Entire water body* bacteria	5c	2002

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1209K_02	*From the confluence with Willow Creek upstream to the end of the water body* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1209L_01	*entire water body* bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1210A_01	*Entire water body* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1211A_02	*Upper 25 miles* bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1212_01	*Eastern end of reservoir near dam*		
	depressed dissolved oxygen	5c	2008
	pH	5c	2002
1212_03	*Middle of reservoir near Birch Creek State Park*		
	pH	5c	2002

[redacted]

Area		Category	Year First Listed
1212B_01	*Lower 25 miles*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1213_01	*From the confluence with Brazos River upstream to confluence with City of Cameron WWTP receiving water*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1214_01	*From confluence with Little River upstream to confl. with Alligator Creek*		
	chloride	5c	2008
	sulfate	5c	2006
	bacteria	5a	2006
1214_02	*From confluence with Alligator Creek upstream to Lake Granger*		
	sulfate	5c	2006
	chloride	5c	2008

[redacted]

Area		Category	Year First Listed
1217_04	*From the FM 1690 crossing to the CR 117 crossing*		
	bacteria	5c	2002
1217_05	*From CR 117 crossing to the upper end of the segment*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1217D_01	*entire water body*		
	depressed dissolved oxygen	5b	2006

[redacted]

Area		Category	Year First Listed
1218_01	*Entire segment*		
	bacteria	5a	1996

[redacted]

Area		Category	Year First Listed
1220A_03	*Upstream portion of water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1221_01	*Directly upstream of Lake Belton*		
	bacteria	5a	1996
1221_04	*From the confluence with Plum Creek, upstream to the confluence with Pecan Creek*		
	bacteria	5a	1996
1221_05	*From confluence with Pecan Creek, upstream to confluence with South Leon Creek*		
	bacteria	5a	1996
1221_06	*From confluence with South Leon Creek upstream to confluence with Walnut Creek*		
	bacteria	5a	1996
1221_07	*From the confluence with Walnut Creek upstream to Lake Proctor*		
	bacteria	5a	1996

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1221A_01	*Downstream portion, from confluence with Leon River upstream to conf. with unnamed tributary, approx. 1.0 mile N. of Comanche County Line*		
	depressed dissolved oxygen	5c	2006
	bacteria	5c	2004
1221A_02	*From confluence with unnamed tributary, upstream to end of water body, approx. 1.0 mile north west of Dublin*		
	bacteria	5c	2004

[redacted]

Area		Category	Year First Listed
1221B_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1221C_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1221D_01	*From confluence with Leon River, upstream to confluence with Armstrong Creek*		
	bacteria	5c	2006
1221D_02	*From confluence with Armstrong Creek upstream to headwaters of water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1221F_01	*entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1222A_01	*Entire creek*		
	bacteria	5c	1999

[redacted]

Area		Category	Year First Listed
1222B_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1222C_01	*Downstream portion of segment*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1222E_01	*entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1223_01	*Entire Segment*		
	bacteria	5c	2006
	depressed dissolved oxygen	5c	2008

[redacted]

Area		Category	Year First Listed
1223A_01	*entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1226B_01	*Entire water body*		
	depressed dissolved oxygen	5c	2006

[redacted]

Area		Category	Year First Listed
1226E_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1226F_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1226K_01	*entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1227_01	*Downstream portion, including Mustang Creek confluence*		
	chloride	5b	2006
	sulfate	5b	2002
	total dissolved solids	5b	2006
1227_02	*Upstream portion, to Lake Pat Cleburne*		
	chloride	5b	2006
	sulfate	5b	2002
	total dissolved solids	5b	2006

[redacted]

Area		Category	Year First Listed
1229_01	*Lower 7 miles*		
	sulfate	5c	2008
	total dissolved solids	5c	2008
1229_02	*Middle 25 miles*		
	chloride	5c	2008
	sulfate	5c	2008
	total dissolved solids	5c	2008
1229_03	*Upper 25 miles*		
	chloride	5c	2008
	sulfate	5c	2008
	total dissolved solids	5c	2008

[redacted]

Area		Category	Year First Listed
1232B_01	*From the confluence with Clear Fork Brazos, upstream to city of Abilene WWTP receiving water*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1238_01	*25 miles near Hwy 83*		
	chloride	5b	2002
1238_02	*25 miles near Hwy 380 at Swenson*		
	chloride	5b	2002
1238_03	*Remainder of segment*		
	chloride	5b	2002

[redacted]

Area		Category	Year First Listed
1240_01	*Entire segment*		
	total dissolved solids	5c	2006
	chloride	5c	2002

[redacted]

Area		Category	Year First Listed
1241_01	*25 miles near Hwy 83*		
	chloride	5b	2006
1241_02	*Remainder of segment*		
	chloride	5b	2006

[redacted]

Area		Category	Year First Listed
1241A_02	*Upstream portion, from confluence with Yellow House Draw to Lake Buffalo Springs*		
	bacteria	5c	2004

[redacted]

Area		Category	Year First Listed
1242B_01	*Downstream portion, downstream of Sanderson Farms receiving water*		
	bacteria	5c	2006
1242B_02	*Upstream portion, upstream of Sanderson Farms receiving water*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1242C_01	*Downstream of Bryan WWTP*		
	bacteria	5c	2006
1242C_02	*Portion upstream of city of Bryan WWTP*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1242D_01	*Portion downstream of the confluence with Still Creek*		
	bacteria	5c	2002
1242D_02	*Portion of segment upstream of confluence with Still Creek*		
	bacteria	5c	2002
	depressed dissolved oxygen	5c	2004

[redacted]

Area		Category	Year First Listed
1242I_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1242J_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1242K_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1242L_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1242M_01	*Entire water body*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1242N_01	*Downstream portion of water body, from confluence with Brazos River upstream to confl. with Little Tehuacana Creek*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1242O_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1242P_01	*Downstream portion of water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1244_03	*From confluence with Cottonwood Branch upstream to City of Round Rock WWTP outfall*		
	bacteria	5a	2006
1244_04	*From immediately upstream of City of Round Rock WWTP outfall upstream to end of segment*		
	bacteria	5a	2006

[redacted]

Area		Category	Year First Listed
1245_01	*From the confluence with the Brazos River upstream to Dam #3*		
	depressed dissolved oxygen	5a	1996
1245_02	*From Dam #3 upstream to Harmon St. crossing in Sugar Land*		
	depressed dissolved oxygen	5a	1996
1245_03	*From Harmon St. crossing in Sugar Land upstream to the end of the segment*		
	depressed dissolved oxygen	5a	1996

[redacted]

Area		Category	Year First Listed
1245C_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1245D_01	*Entire water body*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1246E_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1247A_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1248C_01	*Entire water body*		
	bacteria	5c	2004

[redacted]

Area		Category	Year First Listed
1255_01	*Lower portion of segment downstream of Stephenville*		
	bacteria	5c	1996
1255_02	*Upper portion of segment, upstream of Stephenville*		
	bacteria	5c	1996
	depressed dissolved oxygen	5c	2008

[redacted]

Area		Category	Year First Listed
1255A_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1255B_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1255C_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1255E_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1255F_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1255G_01	*Entire water body*		
	bacteria	5c	2002

[redacted]

Area		Category	Year First Listed
1301_01	*Entire Segment*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1302_01	*Lower 25 miles of segment*		
	bacteria	5a	2002
1302_02	*25 miles from just upstream of FM 442 to downstream of US 90A*		
	bacteria	5a	2002
1302_03	*25 miles from downstream of US 90A to upstream of FM 3013*		
	bacteria	5a	2002

[redacted]

Area		Category	Year First Listed
1302A_01	*The entire 15 miles of the segment*		
	bacteria	5c	2006

2008 Texas 303(d) List (March 19, 2008)

[redacted]

Area		Category	Year First Listed
1302B_01	*Lower 15 miles of segment*		
	depressed dissolved oxygen	5c	2006
1302B_02	*Upper 25 miles of segment*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1304_01	*Lower 25 miles of segment*		
	bacteria	5c	2006

[redacted]

Area		Category	Year First Listed
1305_02	*25 miles surrounding SH 35*		
	bacteria	5a	2002
	depressed dissolved oxygen	5b	1999
1305_03	*Upper 55 miles of segment*		
	depressed dissolved oxygen	5b	1999

[redacted]

Area		Category	Year First Listed
1401_01	*Entire segment*		
	bacteria	5a	2006

Neches River Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Neches River Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0601 Neches River Tidal	0601A Star Lake Canal	0602 Neches River Below B. A. Steinhagen Lake	0602A Booger Branch	0603 B. A. Steinhagen Lake	0603A Sandy Creek	0603B Wolf Creek	0604 Neches River Below Lake Palestine	0604A Cedar Creek	0604B Hurricane Creek	0604C Jack Creek	0604D Piney Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	NA	NA	**NS**	FS	FS	FS	**NS**	**NS**	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	FS	X	FS	X	X	FS	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	**NS**	NA	FS	FS	FS	FS	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	FS	NA	FS	NA	NA	NA	NA	**NS**	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	FS	NA	FS	NA	**PS**	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	FS	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	X	FS	X	NA	X	X	FS	X	X	X	X
pH	FS	X	FS	X	NA	X	X	FS	X	X	X	X
Chloride	X	X	FS	X	NA	X	X	FS	X	X	X	X
Sulfate	X	X	FS	X	NA	X	X	FS	X	X	X	X
Total Dissolved Solids	X	X	FS	X	NA	X	X	FS	X	X	X	X

Neches River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0604H One Eye Creek	0604 Biloxi Creek	0604N Buck Creek	0604T Lake Ratcliff	0605 Lake Palestine	0605A Kickapoo Creek	0606 Neches River Above Lake Palestine	0606A Prairie Creek	0607 Pine Island Bayou	0607A Boggy Creek	0607B Little Pine Island Bayou	0607C Willow Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	FS	FS	NA	FS	**NS**	FS	**NS**	FS	NA	FS	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	FS	X	FS	X	FS	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	FS	FS	FS	FS	**PS**	FS	**PS**	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	**NS**	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	**PS**	FS	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	FS	X	FS	X	FS	X	X	X
pH	X	X	X	X	FS	X	**PS**	X	FS	X	X	X
Chloride	X	X	X	X	FS	X	FS	X	FS	X	X	X
Sulfate	X	X	X	X	FS	X	FS	X	FS	X	X	X
Total Dissolved Solids	X	X	X	X	FS	X	FS	X	FS	X	X	X

Neches River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0608 Village Creek	0608A Beech Creek	0608B Big Sandy Creek	0608C Cypress Creek	0608D Hickory Creek	0608E Mill Creek	0608F Turkey Creek	0608G Lake Kimball	0609 Angelina River Below Sam Rayburn Reservoir	0610 Sam Rayburn Reservoir	0610A Ayish Bayou	0611 Angelina River Above Sam Rayburn Reservoir
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	**NS**	FS	FS	NA	**NS**	NA	FS	FS	FS	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	X	X	X	X	X	X	FS	FS	X	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	NA	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	FS
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FS
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	**PS**	NA	**PS**	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	FS
GENERAL USE SUPPORT												
Water Temperature	FS	X	X	X	X	X	X	X	FS	FS	X	FS
pH	**PS**	X	X	X	X	X	X	X	FS	FS	X	FS
Chloride	FS	X	X	X	X	X	X	X	FS	FS	X	FS
Sulfate	FS	X	X	X	X	X	X	X	FS	FS	X	FS
Total Dissolved Solids	FS	X	X	X	X	X	X	X	FS	FS	X	FS

Neches River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0611A East Fork Angelina River	0611B La Nana Bayou	0611C Mud Creek	0611D West Mud Creek	0611H Ragsdale Creek	0611Q Lake Nacogdoches	0612 Attoyac Bayou	0612B Waffelow Creek	0612C Pinkston Reservoir	0613 Lake Tyler/Lake Tyler East	0614 Lake Jacksonville	0615 Angelina River/Sam Rayburn Reservoir
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	**NS**	**NS**	FS	NA	NA	FS	NA	NA	FS	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	FS	FS	X	FS	FS	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	NA	FS	NA	NA	FS	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	FS
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FS
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NS**
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**PS**
Human Health Criteria	NA	NA	NA	NA	NA	NA	FS	NA	NA	FS	NA	FS
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	X	X	FS	X	X	FS	NA	FS
pH	X	X	X	X	X	X	FS	X	X	FS	NA	FS
Chloride	X	X	X	X	X	X	FS	X	X	FS	FS	FS
Sulfate	X	X	X	X	X	X	FS	X	X	FS	FS	FS
Total Dissolved Solids	X	X	X	X	X	X	FS	X	X	FS	FS	FS

Neches River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0615A Papermill Creek
DESIGNATED USE SUPPORT	
Contact Recreation Use	FS
Noncontact Recreation Use	X
Public Water Supply Use	X
Aquatic Life Use	
Dissolved Oxygen grab min	FS
Dissolved Oxygen 24-hour avg	NA
Dissolved Oxygen 24-hour min	NA
Metals in water	FS
Organics in water	NA
Water Toxicity Tests	NA
Sediment Toxicity Tests	NA
Habitat	NA
Macrobenthos Community	NA
Fish Community	NA
Fish Consumption Use	
Advisories and Closures	NA
Human Health Criteria	FS
GENERAL USE SUPPORT	
Water Temperature	X
pH	X
Chloride	X
Sulfate	X
Total Dissolved Solids	X

Neches River Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0601 Neches River Tidal	0601A Star Lake Canal	0602 Neches River Below B. A. Steinhagen Lake	0602A Booger Branch	0603 B. A. Steinhagen Lake	0603A Sandy Creek	0603B Wolf Creek	0604 Neches River Below Lake Palestine	0604A Cedar Creek	0604B Hurricane Creek	0604C Jack Creek	0604D Piney Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NA	NA	NC	NC	NC	**C**	**C**	**C**	NC
Nitrite + Nitrate Nitrogen	NC	**C**	NC	NA	NA	NC	NC	NC	**C**	NC	**C**	NC
Orthophosphorus	NC	**C**	NC	NA	NA	NA	NA	NC	NA	NA	NA	NA
Total Phosphorus	NC	**C**	NC	NA	NA	NA	NA	NC	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NC	NC	NC	NA	NA	NA	NA	NC	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	NC	X	NC	X	X	NC	X	X	X	X
Finished Water: Sulfate	X	X	NC	X	NC	X	X	NC	X	X	X	X
Finished Water: TDS	X	X	NC	X	NC	X	X	NC	X	X	X	X
Surface Water: Chloride	X	X	NC	X	NA	X	X	NC	X	X	X	X
Surface Water: Sulfate	X	X	NC	X	NA	X	X	NC	X	X	X	X
Surface Water: TDS	X	X	NC	X	NA	X	X	NC	X	X	X	X

Neches River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0604H One Eye Creek	0604 Biloxi Creek	0604N Buck Creek	0604T Lake Ratcliff	0605 Lake Palestine	0605A Kickapoo Creek	0606 Neches River Above Lake Palestine	0606A Prairie Creek	0607 Pine Island Bayou	0607A Boggy Creek	0607B Little Pine Island Bayou	0607C Willow Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NC	NA	**C**	**C**	NC	NA	NC	NA	NC	NC
Nitrite + Nitrate Nitrogen	NA	NC	NC	NA	**C**	NC	**C**	NA	NC	NA	NC	NC
Orthophosphorus	NA	NA	NA	NA	NC	NA	NC	NA	NC	NA	NA	NA
Total Phosphorus	NA	NA	NA	NA	NC	NA	NC	NA	NC	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NC	NA	NC	NA	NC	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	NC	X	NC	X	NC	X	X	X
Finished Water: Sulfate	X	X	X	X	NC	X	NC	X	NC	X	X	X
Finished Water: TDS	X	X	X	X	NC	X	NC	X	NC	X	X	X
Surface Water: Chloride	X	X	X	X	NC	X	NC	X	NC	X	X	X
Surface Water: Sulfate	X	X	X	X	NC	X	NC	X	NC	X	X	X
Surface Water: TDS	X	X	X	X	NC	X	NC	X	NC	X	X	X

Neches River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0608 Village Creek	0608A Beech Creek	0608B Big Sandy Creek	0608C Cypress Creek	0608D Hickory Creek	0608E Mill Creek	0608F Turkey Creek	0608G Lake Kimball	0609 Angelina River Below Sam Rayburn Reservoir	0610 Sam Rayburn Reservoir	0610A Ayish Bayou	0611 Angelina River Above Sam Rayburn Reservoir
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	**C**	NA	NC	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NC	NC	NA	NC	NA	NC	NC	NA	NC
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NC	NA	NC	NA	NC	NC	NA	NC
Orthophosphorus	NC	NA	NA	NA	NA	NA	NA	NA	NC	NC	NA	NC
Total Phosphorus	NC	NA	NA	NA	NA	NA	NA	NA	NC	**C**	NA	NC
Algal Growth												
Chlorophyll *a*	NC	NA	NA	NA	NA	NA	NA	NA	NA	NC	NA	NC
Public Water Supply												
Finished Water: Chloride	NC	X	X	X	X	X	X	X	NC	NC	X	NC
Finished Water: Sulfate	NC	X	X	X	X	X	X	X	NC	NC	X	NC
Finished Water: TDS	NC	X	X	X	X	X	X	X	NC	NC	X	NC
Surface Water: Chloride	NC	X	X	X	X	X	X	X	NC	NC	X	NC
Surface Water: Sulfate	NC	X	X	X	X	X	X	X	NC	NC	X	NC
Surface Water: TDS	NC	X	X	X	X	X	X	X	NC	NC	X	NC

Neches River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0611A East Fork Angelina River	0611B La Nana Bayou	0611C Mud Creek	0611D West Mud Creek	0611H Ragsdale Creek	0611Q Lake Nacogdoches	0612 Attoyac Bayou	0612B Waffelow Creek	0612C Pinkston Reservoir	0613 Lake Tyler/Lake Tyler East	0614 Lake Jacksonville	0615 Angelina River/Sam Rayburn Reservoir
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NC	NA	NA	NC	NC	NA	NC
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**
Nutrient Enrichment												
Ammonia Nitrogen	NC	**C**	NC	NC	NA	NA	NC	NA	NA	NC	NA	**C**
Nitrite + Nitrate Nitrogen	NC	NC	NC	**C**	NA	NA	NC	NA	NA	NC	NA	**C**
Orthophosphorus	NA	NA	NA	NA	NA	NA	NC	NA	NA	NC	NA	**C**
Total Phosphorus	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NA	**C**
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NA	NC
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	NC	NC	X	NC	NC	NC	NC
Finished Water: Sulfate	X	X	X	X	X	NC	NC	X	NC	NC	NC	NC
Finished Water: TDS	X	X	X	X	X	NC	NC	X	NC	NC	NC	NC
Surface Water: Chloride	X	X	X	X	X	NA	NC	X	NA	NC	NC	NC
Surface Water: Sulfate	X	X	X	X	X	NA	NC	X	NA	NC	NC	NC
Surface Water: TDS	X	X	X	X	X	NA	NC	X	NA	NC	NC	NC

Neches River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0615A Papermill Creek
WATER QUALITY CONCERNS	
Sediment Contaminants	NA
Fish Tissue Contaminants	NA
Narrative	**C**
Nutrient Enrichment	
Ammonia Nitrogen	**C**
Nitrite + Nitrate Nitrogen	NC
Orthophosphorus	**C**
Total Phosphorus	**C**
Algal Growth	
Chlorophyll *a*	NC
Public Water Supply	
Finished Water: Chloride	X
Finished Water: Sulfate	X
Finished Water: TDS	X
Surface Water: Chloride	X
Surface Water: Sulfate	X
Surface Water: TDS	X

Neches - Trinity Coastal Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Neches-Trinity Coastal Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0701 Taylor Bayou Above Tidal	0701D Shallow Prong Lake	0702 Intracoastal Waterway Tidal	0702A Alligator Bayou	0703 Sabine-Neches Canal Tidal	0704 Hillebrandt Bayou	0704A Willow Marsh Bayou	0704B Kidd Gully	0704C Pevitot Gully
DESIGNATED USE SUPPORT									
Contact Recreation Use	FS	NA	FS	FS	FS	FS	NA	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	X
Aquatic Life Use									
Dissolved Oxygen grab min	FS	NA	FS	FS	FS	FS	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	FS	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	FS	NA	NA	**NS**	NA	NA	NA	NA	NA
Fish Consumption Use									
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT									
Water Temperature	FS	X	FS	X	FS	FS	X	X	X
pH	FS	X	FS	X	FS	FS	X	X	X
Chloride	FS	X	X	X	X	FS	X	X	X
Sulfate	FS	X	X	X	X	FS	X	X	X
Total Dissolved Solids	FS	X	X	X	X	FS	X	X	X

Neches-Trinity Coastal Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0701 Taylor Bayou Above Tidal	0701D Shallow Prong Lake	0702 Intracoastal Waterway Tidal	0702A Alligator Bayou	0703 Sabine-Neches Canal Tidal	0704 Hillebrandt Bayou	0704A Willow Marsh Bayou	0704B Kidd Gully	0704C Pevitot Gully
WATER QUALITY CONCERNS									
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NC	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	**C**	NC	NC	NC	NC	NC
Nutrient Enrichment									
Ammonia Nitrogen	NC	NA	NC	NC	NC	**C**	NA	NA	NA
Nitrite + Nitrate Nitrogen	NC	NA	NC	NC	NC	NC	NA	NA	NA
Orthophosphorus	NC	NA	NC	NC	NC	NC	NA	NA	NA
Total Phosphorus	NC	NA	NC	NC	NC	NC	NA	NA	NA
Algal Growth									
Chlorophyll *a*	**C**	NA	NC	**C**	NC	**C**	NA	NA	NA
Public Water Supply									
Finished Water: Chloride	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	X	X	X

Trinity River Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Trinity River Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0801 Trinity River Tidal	0802 Trinity River Below Lake Livingston	0803 Lake Livingston	0803A Harmon Creek	0804 Trinity River Above Lake Livingston	0804F Tehuacana Creek	0805 Upper Trinity River	0806 West Fork Trinity River Below Lake Worth	0806A Fosdic Lake	0806B Echo Lake	0807 Lake Worth	0808 West Fork Trinity River Below Eagle Mtn. Res.
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	FS	FS	NA	FS	NA	NA	NA	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	FS	FS	X	X	X	X	FS	X	X	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	NA	NA	NA	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	FS	FS	FS	FS	FS	FS	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	FS	NA	NA	NA	**NS**	**NS**	**NS**	**NS**	**NS**	NA
Human Health Criteria	NA	FS	FS	NA	FS	FS	FS	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	FS	X	FS	X	FS	FS	X	X	NA	NA
pH	FS	FS	**PS**	X	FS	X	FS	FS	X	X	NA	NA
Chloride	X	FS	FS	X	FS	X	FS	NA	X	X	NA	NA
Sulfate	X	FS	FS	X	FS	X	FS	NA	X	X	NA	NA
Total Dissolved Solids	X	FS	FS	X	FS	X	FS	FS	X	X	NA	NA

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0809 Eagle Mountain Reservoir	0810 West Fork Trinity River Below Bridgeport Res.	0811 Bridgeport Reservoir	0812 West Fork Trinity River Above Bridgeport Res.	0813 Houston County Lake	0814 Chambers Creek Above Richland-Chambers Res.	0815 Bardwell Reservoir	0815A Waxahachie Creek	0816 Lake Waxahachie	0817 Navarro Mills Lake	0818 Cedar Creek Reservoir	0819 East Fork Trinity River
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	**NS**	FS	NA	NA	NA	NA	NA	NA	NA	FS	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	FS	FS	FS	FS	FS	X	FS	FS	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	NA	FS	FS	NA	NA	NA	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	FS	NA	FS	NA	NA	FS	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	FS	NA	FS	NA	NA	FS	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	FS	NA	NA	FS	FS	X	NA	NA	FS	FS
pH	FS	FS	FS	NA	NA	FS	FS	X	NA	NA	**NS**	FS
Chloride	FS	FS	FS	NA	NA	FS	NA	X	NA	NA	FS	FS
Sulfate	FS	FS	FS	NA	NA	FS	NA	X	NA	NA	FS	FS
Total Dissolved Solids	FS	FS	FS	NA	NA	FS	FS	X	NA	NA	FS	FS

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0820 Lake Ray Hubbard	0820C Muddy Creek	0821 Lake Lavon	0821A Pilot Grove Creek	0821B Sister Grove Creek	0822 Elm Fork Trinity River Below Lewisville Lake	0823 Lewisville Lake	0823A Little Elm Creek	0823B Stewart Creek	0823C Clear Creek	0824 Elm Fork Trinity River Above Ray Roberts Lake	0825 Denton Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	**NS**	NA	NA	NA	FS	NA	**NS**	NA	FS	**NS**	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	FS	X	X	FS	FS	X	X	X	X	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	NA	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	FS	FS	FS	NA	NA	NA	NA	FS	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	FS	FS	NA	FS	FS	FS	FS	NA	NA	NA	FS	NA
GENERAL USE SUPPORT												
Water Temperature	FS	X	FS	X	X	FS	FS	X	X	X	FS	FS
pH	FS	X	FS	X	X	FS	FS	X	X	X	FS	FS
Chloride	FS	X	FS	X	X	FS	FS	X	X	X	FS	FS
Sulfate	NA	X	FS	X	X	FS	FS	X	X	X	FS	FS
Total Dissolved Solids	FS	X	NA	X	X	FS	FS	X	X	X	FS	FS

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0826 Grapevine Lake	0826A Denton Creek	0827 White Rock Lake	0828 Lake Arlington	0828A Village Creek	0829 Clear Fork Trinity River Below Benbrook Lake	0829A Lake Como	0830 Benbrook Lake	0831 Clear Fork Trinity River Below Lake Weatherford	0832 Lake Weatherford	0833 Clear Frk. Trinity R. Above L. Weatherford	0834 Lake Amon G. Carter
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	FS	NA	NA	NA	FS	NA	FS	**NS**	NA	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	X	FS	X	FS	X	FS	FS	FS	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	NA	FS	NA	FS	FS	FS	NA	FS	FS	NA	**PS**	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	**NS**	**NS**	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	NA	X	NA	NA	X	FS	X	FS	FS	NA	FS	NA
pH	NA	X	NA	FS	X	FS	X	FS	FS	NA	FS	NA
Chloride	NA	X	NA	FS	X	FS	X	FS	FS	NA	NA	NA
Sulfate	NA	X	NA	FS	X	FS	X	FS	FS	NA	NA	NA
Total Dissolved Solids	FS	X	NA	FS	X	FS	X	FS	FS	NA	FS	NA

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0835 Richland Creek Below Richland-Chambers Res.	0836 Richland-Chambers Reservoir	0837 Richland Creek Above Richland-Chambers Res.	0838 Joe Pool Lake	0839 Elm Fork Trinity River Below Ray Roberts Lake	0840 Ray Roberts Lake	0840A Unnamed tributary of Jordan Creek	0841 Lower West Fork Trinity River	0841A Mountain Creek Lake
DESIGNATED USE SUPPORT									
Contact Recreation Use	NA	FS	FS	NA	NA	FS	NA	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	FS	FS	FS	FS	X	X	FS
Aquatic Life Use									
Dissolved Oxygen grab min	NA	FS	FS	FS	NA	FS	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	FS	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity Tests	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use									
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	**NS**	**NS**
Human Health Criteria	NA	FS	NA	FS	NA	FS	NA	NA	NA
GENERAL USE SUPPORT									
Water Temperature	NA	FS	FS	FS	NA	FS	X	FS	X
pH	NA	**PS**	FS	FS	NA	FS	X	FS	X
Chloride	NA	FS	FS	NA	NA	FS	X	FS	X
Sulfate	NA	FS	FS	FS	NA	FS	X	FS	X
Total Dissolved Solids	NA	FS	FS	FS	NA	FS	X	FS	X

Trinity River Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0801 Trinity River Tidal	0802 Trinity River Below Lake Livingston	0803 Lake Livingston	0803A Harmon Creek	0804 Trinity River Above Lake Livingston	0804F Tehuacana Creek	0805 Upper Trinity River	0806 West Fork Trinity River Below Lake Worth	0806A Fosdic Lake	0806B Echo Lake	0807 Lake Worth	0808 West Fork Trinity River Below Eagle Mtn. Res.
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NC	NA	NA	NA	NA	NC	NC	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NC	NC	NC	**C**	NC	NA	NA	NA	NA
Nitrite + Nitrate Nitrogen	NC	NC	**C**	NC	**C**	NC	**C**	NC	NA	NA	NA	NA
Orthophosphorus	NC	NC	**C**	**C**	**C**	NC	**C**	NC	NA	NA	NA	NA
Total Phosphorus	NC	NC	**C**	**C**	**C**	NA	**C**	NC	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NC	NC	**C**	NA	**C**	NA	NC	**C**	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	NC	NC	X	X	X	X	NC	X	X	NC	NC
Finished Water: Sulfate	X	NC	NC	X	X	X	X	NC	X	X	NC	NC
Finished Water: TDS	X	NC	NC	X	X	X	X	NC	X	X	NC	NC
Surface Water: Chloride	X	NC	NC	X	X	X	X	NA	X	X	NA	NA
Surface Water: Sulfate	X	NC	NC	X	X	X	X	NA	X	X	NA	NA
Surface Water: TDS	X	NC	NC	X	X	X	X	NC	X	X	NA	NA

Trinity River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0809 Eagle Mountain Reservoir	0810 West Fork Trinity R. Below Bridgeport Res.	0811 Bridgeport Reservoir	0812 West Fork Trinity River Above Bridgeport Res.	0813 Houston County Lake	0814 Chambers Creek Above Richland-Chambers Res.	0815 Bardwell Reservoir	0815A Waxahachie Creek	0816 Lake Waxahachie	0817 Navarro Mills Lake	0818 Cedar Creek Reservoir	0819 East Fork Trinity River
WATER QUALITY CONCERNS												
Sediment Contaminants	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NC	NA	NA	NA	NC	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NA	NA	NC	NC	NA	NA	NA	**C**	**C**
Nitrite + Nitrate Nitrogen	NC	NC	NC	NA	NA	NC	**C**	NA	NA	NA	NC	**C**
Orthophosphorus	NC	NC	NC	NA	NA	NC	NC	NA	NA	NA	**C**	**C**
Total Phosphorus	**C**	NC	NC	NA	NA	NA	NA	NA	NA	NA	**C**	NA
Algal Growth												
Chlorophyll *a*	**C**	NC	NC	NA	NA	NA	NA	NA	NA	NA	**C**	NA
Public Water Supply												
Finished Water: Chloride	NC	NC	NC	NC	NC	NC	NC	X	NC	NC	NC	X
Finished Water: Sulfate	NC	NC	NC	NC	NC	NC	NC	X	NC	NC	NC	X
Finished Water: TDS	NC	NC	NC	NC	NC	NC	NC	X	NC	NC	NC	X
Surface Water: Chloride	NC	NC	NC	NA	NA	NC	NA	X	NA	NA	NC	X
Surface Water: Sulfate	NC	NC	NC	NA	NA	NC	NA	X	NA	NA	NC	X
Surface Water: TDS	NC	NC	NC	NA	NA	NC	NC	X	NA	NA	NC	X

Trinity River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0820 Lake Ray Hubbard	0820C Muddy Creek	0821 Lake Lavon	0821A Pilot Grove Creek	0821B Sister Grove Creek	0822 Elm Fork Trinity River Below Lewisville Lake	0823 Lewisville Lake	0823A Little Elm Creek	0823B Stewart Creek	0823C Clear Creek	0824 Elm Fork Trinity River Above Ray Roberts Lake	0825 Denton Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC
Nutrient Enrichment												
Ammonia Nitrogen	**C**	**C**	NC	NC	NC	**C**	**C**	**C**	NA	NC	**C**	NC
Nitrite + Nitrate Nitrogen	**C**	**C**	**C**	NC	NC	NC	**C**	NC	NA	NC	**C**	NC
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NA	NC	**C**	NC
Total Phosphorus	NC	NC	NA	NA	NA	NC	NC	NC	NA	NC	**C**	NA
Algal Growth												
Chlorophyll *a*	**C**	NA	NA	NA	NA	**C**	NC	NA	NA	NA	**C**	NA
Public Water Supply												
Finished Water: Chloride	NC	X	NC	X	X	NC	NC	X	X	X	X	NC
Finished Water: Sulfate	NC	X	NC	X	X	NC	NC	X	X	X	X	NC
Finished Water: TDS	NC	X	NC	X	X	NC	NC	X	X	X	X	NC
Surface Water: Chloride	NC	X	NC	X	X	NC	NC	X	X	X	X	NC
Surface Water: Sulfate	NA	X	NC	X	X	NC	NC	X	X	X	X	NC
Surface Water: TDS	NC	X	NA	X	X	NC	NC	X	X	X	X	NC

Trinity River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0826 Grapevine Lake	0826A Denton Creek	0827 White Rock Lake	0828 Lake Arlington	0828A Village Creek	0829 Clear Fork Trinity River Below Benbrook Lake	0829A Lake Como	0830 Benbrook Lake	0831 Clear Fork Trinity River Below Lake Weatherford	0832 Lake Weatherford	0833 Clear Frk. Trinity R. Above L. Weatherford	0834 Lake Amon G. Carter
WATER QUALITY CONCERNS												
Sediment Contaminants	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	**C**	NA	NC	NC	NC	NA	**C**	NC	NA	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	NA	NC	NC	NC	NA	NC	NC	NA	NC	NA
Orthophosphorus	NC	NC	NA	NC	NC	NC	NA	NC	**C**	NA	NC	NA
Total Phosphorus	NC	NC	NA	NA	NA	NC	NA	NC	NC	NA	NC	NA
Algal Growth												
Chlorophyll *a*	NC	NA	NA	NA	NA	NC	NA	**C**	NC	NA	NC	NA
Public Water Supply												
Finished Water: Chloride	NC	X	X	NC	X	NC	X	NC	NC	NC	NC	NC
Finished Water: Sulfate	NC	X	X	NC	X	NC	X	NC	NC	NC	NC	NC
Finished Water: TDS	NC	X	X	NC	X	NC	X	NC	NC	NC	NC	NC
Surface Water: Chloride	NA	X	X	NC	X	NC	X	NC	NC	NA	NA	NA
Surface Water: Sulfate	NA	X	X	NC	X	NC	X	NC	NC	NA	NA	NA
Surface Water: TDS	NC	X	X	NC	X	NC	X	NC	NC	NA	NA	NA

Trinity River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0835 Richland Cr. Below Richland-Chambers Res.	0836 Richland-Chambers Reservoir	0837 Richland Creek Above Richland-Chambers Res.	0838 Joe Pool Lake	0839 Elm Fork Trinity River Below Ray Roberts Lake	0840 Ray Roberts Lake	0840A Unnamed tributary of Jordan Creek	0841 Lower West Fork Trinity River	0841A Mountain Creek Lake
WATER QUALITY CONCERNS									
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NC	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment									
Ammonia Nitrogen	NA	NC	NC	NA	NA	**C**	**C**	NC	NA
Nitrite + Nitrate Nitrogen	NA	**C**	NC	NA	NA	**C**	NC	**C**	NA
Orthophosphorus	NA	NC	NC	NA	NA	**C**	**C**	**C**	NA
Total Phosphorus	NA	NC	NC	NA	NA	**C**	NA	**C**	NA
Algal Growth									
Chlorophyll *a*	NA	**C**	NC	NA	NA	NC	NA	NC	NA
Public Water Supply									
Finished Water: Chloride	NC	NC	NC	NC	NC	NC	X	X	NC
Finished Water: Sulfate	NC	NC	NC	NC	NC	NC	X	X	NC
Finished Water: TDS	NC	NC	NC	NC	NC	NC	X	X	NC
Surface Water: Chloride	NA	NC	NC	NA	NA	NC	X	X	NA
Surface Water: Sulfate	NA	NC	NC	NC	NA	NC	X	X	NA
Surface Water: TDS	NA	NC	NC	NC	NA	NC	X	X	NA

Trinity – San Jacinto Coastal Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Trinity-San Jacinto Coastal Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	0901 Cedar Bayou Tidal	0902 Cedar Bayou Above Tidal
DESIGNATED USE SUPPORT		
Contact Recreation Use	FS	FS
Noncontact Recreation Use	X	X
Public Water Supply Use	X	FS
Aquatic Life Use		
Dissolved Oxygen grab min	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA
Dissolved Oxygen 24-hour min	NA	NA
Metals in water	NA	NA
Organics in water	NA	NA
Water Toxicity Tests	NA	NA
Sediment Toxicity Tests	NA	NA
Habitat	NA	NA
Macrobenthos Community	NA	NA
Fish Community	NA	NA
Fish Consumption Use		
Advisories and Closures	**NS**	NA
Human Health Criteria	NA	NA
GENERAL USE SUPPORT		
Water Temperature	FS	FS
pH	FS	FS
Chloride	X	FS
Sulfate	X	FS
Total Dissolved Solids	X	FS

Trinity-San Jacinto Coastal Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	0901 Cedar Bayou Tidal	0902 Cedar Bayou Above Tidal
WATER QUALITY CONCERNS		
Sediment Contaminants	NA	NA
Fish Tissue Contaminants	NA	NA
Narrative	NC	NC
Nutrient Enrichment		
Ammonia Nitrogen	NC	NC
Nitrite + Nitrate Nitrogen	NC	NC
Orthophosphorus	NC	NC
Total Phosphorus	NC	NC
Algal Growth		
Chlorophyll *a*	NC	NC
Public Water Supply		
Finished Water: Chloride	X	NC
Finished Water: Sulfate	X	NC
Finished Water: TDS	X	NC
Surface Water: Chloride	X	NC
Surface Water: Sulfate	X	NC
Surface Water: TDS	X	NC

San Jacinto River Basin
Summary Tables

This Page
Intentionally Left Blank

<u>Basin Tabular Summaries</u>

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

San Jacinto River Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	San Jacinto River Tidal 1001	Lake Houston 1002	Luce Bayou 1002B	East Fork San Jacinto River 1003	West Fork San Jacinto River 1004	Houston Ship Ch./San Jacinto River Tidal 1005	Houston Ship Channel Tidal 1006	Halls Bayou Below US 59 1006D	Halls Bayou Above US 59 1006E	Big Gulch Above Tidal 1006F	Spring Gully Above Tidal 1006H	Unnamed Tributary of Halls Bayou 1006I
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	FS	**NS**	X	X	**NS**	**NS**	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	FS	X	X	X	X	X	X
Public Water Supply Use	X	FS	X	FS	FS	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	NA	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	FS	FS	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	**NS**	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	**NS**	FS	NA	NA	NA	**NS**	**NS**	NA	NA	NA	NA	NA
Human Health Criteria	FS	FS	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	X	FS	FS	FS	FS	X	X	X	X	X
pH	FS	FS	X	FS	FS	FS	FS	X	X	X	X	X
Chloride	X	FS	X	FS	FS	X	X	X	X	X	X	X
Sulfate	X	FS	X	FS	FS	X	X	X	X	X	X	X
Total Dissolved Solids	X	FS	X	FS	FS	X	X	X	X	X	X	X

San Jacinto River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	Unnamed Tributary of Halls Bayou 1006J	Houston Ship Ch./ Buffalo Bayou Tidal 1007	Brays Bayou Above Tidal 1007B	Keegans Bayou Above Tidal 1007C	Sims Bayou Above Tidal 1007D	Willow Waterhole Bayou Above Tidal 1007E	Berry Bayou Above Tidal 1007F	Kuhlman Gully Above Tidal 1007G	Pine Gully Above Tidal 1007H	Plum Creek Above Tidal 1007I	Country Club Bayou Above Tidal 1007K	Unnamed Non-Tidal Trib. of Brays Bayou 1007L
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	X	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	**NS**	**NS**	**NS**	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	**PS**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	**NS**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	FS	X	X	X	X	X	X	X	X	X	X
pH	X	FS	X	X	X	X	X	X	X	X	X	X
Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Total Dissolved Solids	X	X	X	X	X	X	X	X	X	X	X	X

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1007M Unnamed Non-Tidal Trib. of Hunting Bayou	1007N Unnamed Non-Tidal Tributary of Sims Bayou	1007O Unnamed Non-Tidal Trib. of Buffalo Bayou	1007P Brays Bayou Above Tidal	1007Q Sims Bayou Above Tidal	1007R Hunting Bayou Above Tidal	1008 Spring Creek	1008B Upper Panther Branch	1008C Lower Panther Branch	1008E Bear Branch	1008F Lake Woodlands	1008G Upper Panther Branch above Bear Branch
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	FS	NA	FS	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	FS	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	**NS**	FS	**PS**	**NS**	FS	FS	FS	FS	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	X	X	FS	X	X	X	X	X
pH	X	X	X	X	X	X	FS	X	X	X	X	X
Chloride	X	X	X	X	X	X	FS	X	X	X	X	X
Sulfate	X	X	X	X	X	X	FS	X	X	X	X	X
Total Dissolved Solids	X	X	X	X	X	X	FS	X	X	X	X	X

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1009 Cypress Creek	1010 Caney Creek	1011 Peach Creek	1012 Lake Conroe	1013 Buffalo Bayou Tidal	1013A Little White Oak Bayou	1013C Unmd. Non-Tidal Trib. of Buffalo Bayou Tidal	1014 Buffalo Bayou Above Tidal	1014H South Mayde Creek	1014K Turkey Creek	1014M Neimans Bayou	1014N Rummel Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	FS	FS	NA	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	FS	FS	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	**PS**	FS	FS	FS	FS	**NS**	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	FS	FS	FS	X	X	FS	X	X	X	X
pH	FS	FS	FS	FS	FS	X	X	FS	X	X	X	X
Chloride	FS	FS	FS	FS	X	X	X	FS	X	X	X	X
Sulfate	FS	FS	FS	FS	X	X	X	FS	X	X	X	X
Total Dissolved Solids	FS	FS	FS	FS	X	X	X	FS	X	X	X	X

Trinity River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1014O Spring Branch	1015 Lake Creek	1016 Greens Bayou Above Tidal	1016A Garners Bayou	1016B Unnamed Tributary of Greens Bayou	1016C Unnamed Tributary of Greens Bayou	1016D Unnamed Tributary of Greens Bayou	1017 Whiteoak Bayou Above Tidal	1017A Brickhouse Gully / Bayou	1017B Cole Creek	1017D Unnamed Tributary of White Oak Bayou	1017E Unnamed Tributary of White Oak Bayou
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	NA	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	FS	X	X	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	**PS**	FS	FS	FS	**NS**	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	NA	FS	X	X	X	X	FS	X	X	X	X
pH	X	NA	FS	X	X	X	X	FS	X	X	X	X
Chloride	X	NA	FS	X	X	X	X	FS	X	X	X	X
Sulfate	X	NA	FS	X	X	X	X	FS	X	X	X	X
Total Dissolved Solids	X	NA	FS	X	X	X	X	FS	X	X	X	X

San Jacinto River Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1001 San Jacinto River Tidal	1002 Lake Houston	1002B Luce Bayou	1003 East Fork San Jacinto River	1004 West Fork San Jacinto River	1005 Houston Ship Ch./San Jacinto River Tidal	1006 Houston Ship Channel Tidal	1006D Halls Bayou Below US 59	1006E Halls Bayou Above US 59	1006F Big Gulch Above Tidal	1006H Spring Gully Above Tidal	1006I Unnamed Tributary of Halls Bayou
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	**C**	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	**C**	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NC	NC	NC	**C**	**C**	**C**	**C**	**C**	**C**
Nitrite + Nitrate Nitrogen	NC	**C**	NC	NC	**C**	NC	**C**	NA	NA	NA	NA	NA
Orthophosphorus	NC	**C**	NC	NC	**C**	NC	NC	NA	NA	NA	NA	NA
Total Phosphorus	NC	**C**	NC	NC	NC	NC	NC	NA	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NC	NC	NA	NC	NC	NC	NC	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	NC	X	NC	NC	X	X	X	X	X	X	X
Finished Water: Sulfate	X	NC	X	NC	NC	X	X	X	X	X	X	X
Finished Water: TDS	X	NC	X	NC	NC	X	X	X	X	X	X	X
Surface Water: Chloride	X	NC	X	NC	NC	X	X	X	X	X	X	X
Surface Water: Sulfate	X	NC	X	NC	NC	X	X	X	X	X	X	X
Surface Water: TDS	X	NC	X	NC	NC	X	X	X	X	X	X	X

San Jacinto River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1006J Unnamed Tributary of Halls Bayou	1007 Houston Ship Ch./Buffalo Bayou Tidal	1007B Brays Bayou Above Tidal	1007C Keegans Bayou Above Tidal	1007D Sims Bayou Above Tidal	1007E Willow Waterhole Bayou Above Tidal	1007F Berry Bayou Above Tidal	1007G Kuhlman Gully Above Tidal	1007H Pine Gully Above Tidal	1007I Plum Creek Above Tidal	1007K Country Club Bayou Above Tidal	1007L Unnamed Non-Tidal Trib. of Brays Bayou
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	**C**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	**C**	**C**	**C**	**C**	**C**	NC	**C**	**C**	**C**	**C**	**C**	NC
Nitrite + Nitrate Nitrogen	NA	**C**	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Orthophosphorus	NA	**C**	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Phosphorus	NA	**C**	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X

San Jacinto River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1007M Unnamed Non-Tidal Trib. of Hunting Bayou	1007N Unnamed Non-Tidal Tributary of Sims Bayou	1007O Unnamed Non-Tidal Trib. of Buffalo Bayou	1007P Brays Bayou Above Tidal	1007Q Sims Bayou Above Tidal	1007R Hunting Bayou Above Tidal	1008 Spring Creek	1008B Upper Panther Branch	1008C Lower Panther Branch	1008E Bear Branch	1008F Lake Woodlands	1008G Upper Panther Branch above Bear Branch
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	**C**	**C**	**C**	**C**	**C**	NC	**C**	NC	NC	NA	**C**
Nitrite + Nitrate Nitrogen	NA	NA	NA	NA	**C**	NA	**C**	NA	NA	NA	NA	NA
Orthophosphorus	NA	NA	NA	NA	**C**	NA	**C**	NA	NA	NA	NA	NA
Total Phosphorus	NA	NA	NA	NA	**C**	NA	**C**	**C**	NA	NC	NA	NC
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NC	NA	NC	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	NC	X	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	NC	X	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	NC	X	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	NC	X	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	NC	X	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	NC	X	X	X	X	X

San Jacinto River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1009 Cypress Creek	1010 Caney Creek	1011 Peach Creek	1012 Lake Conroe	1013 Buffalo Bayou Tidal	1013A Little White Oak Bayou	1013C Unmd. Non-Tidal Trib. of Buffalo Bayou Tidal	1014 Buffalo Bayou Above Tidal	1014H South Mayde Creek	1014K Turkey Creek	1014M Neimans Bayou	1014N Rummel Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	**C**	NC	NC	NC	NC	**C**	**C**	**C**	NC	NC	**C**	**C**
Nitrite + Nitrate Nitrogen	**C**	NC	NC	NC	**C**	NA	NA	**C**	NA	NA	NA	NA
Orthophosphorus	**C**	NC	NC	NC	**C**	NA	NA	**C**	NA	NA	NA	NA
Total Phosphorus	**C**	NC	NC	NC	**C**	NA	NA	**C**	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NC	NC	NC	NA	NC	NA	NA	NC	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	NC	NC	NC	NC	X	X	X	X	X	X	X	X
Finished Water: Sulfate	NC	NC	NC	NC	X	X	X	X	X	X	X	X
Finished Water: TDS	NC	NC	NC	NC	X	X	X	X	X	X	X	X
Surface Water: Chloride	NC	NC	NC	NC	X	X	X	X	X	X	X	X
Surface Water: Sulfate	NC	NC	NC	NC	X	X	X	X	X	X	X	X
Surface Water: TDS	NC	NC	NC	NC	X	X	X	X	X	X	X	X

San Jacinto River Basin Tabular Summary of Water Quality Concerns (continued)

	1014O Spring Branch	1015 Lake Creek	1016 Greens Bayou Above Tidal	1016A Garners Bayou	1016B Unnamed Tributary of Greens Bayou	1016C Unnamed Tributary of Greens Bayou	1016D Unnamed Tributary of Greens Bayou	1017 Whiteoak Bayou Above Tidal	1017A Brickhouse Gully / Bayou	1017B Cole Creek	1017D Unnamed Tributary of White Oak Bayou	1017E Unnamed Tributary of White Oak Bayou
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NA	**C**	**C**	NC	**C**	**C**	**C**	**C**	**C**	**C**	NC
Nitrite + Nitrate Nitrogen	NA	NA	**C**	NA	NA	NA	NA	**C**	NA	NA	NA	NA
Orthophosphorus	NA	NA	**C**	NA	NA	NA	NA	**C**	NA	NA	NA	NA
Total Phosphorus	NA	NA	**C**	NA	NA	NA	NA	**C**	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NC	NA	NA	NA	NA	NC	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	NC	X	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	X	NC	X	X	X	X	X	X	X	X	X	X
Finished Water: TDS	X	NC	X	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	X	NA	X	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	X	NA	X	X	X	X	X	X	X	X	X	X
Surface Water: TDS	X	NA	X	X	X	X	X	X	X	X	X	X

San Jacinto – Brazos Coastal Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

San Jacinto-Brazos Coastal Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1101 Clear Creek Tidal	1101B Chigger Creek	1102 Clear Creek Above Tidal	1102A Cowart Creek	1102B Mary's Creek/ North Fork Mary's Creek	1103 Dickinson Bayou Tidal	1103A Bensons Bayou	1103B Bordens Gully	1103C Geisler Bayou	1103D Gum Bayou	1104 Dickinson Bayou Above Tidal	1105 Bastrop Bayou Tidal
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	**NS**	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	**PS**	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	**NS**	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	FS	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	X	FS	X	X	FS	X	X	X	X	FS	FS
pH	FS	X	FS	X	X	FS	X	X	X	X	FS	FS
Chloride	X	X	**NS**	X	X	X	X	X	X	X	FS	X
Sulfate	X	X	FS	X	X	X	X	X	X	X	FS	X
Total Dissolved Solids	X	X	**NS**	X	X	X	X	X	X	X	FS	X

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1107 Chocolate Bayou Tidal	1108 Chocolate Bayou Above Tidal	1109 Oyster Creek Tidal	1110 Oyster Creek Above Tidal	1111 Old Brazos River Channel Tidal	1113 Armand Bayou Tidal	1113A Armand Bayou Above Tidal
DESIGNATED USE SUPPORT							
Contact Recreation Use	FS	FS	FS	FS	FS	FS	NA
Noncontact Recreation Use	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	FS	X	X	X
Aquatic Life Use							
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	FS	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use							
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT							
Water Temperature	FS	FS	FS	FS	FS	FS	X
pH	FS	FS	FS	FS	FS	FS	X
Chloride	X	FS	X	FS	X	X	X
Sulfate	X	FS	X	FS	X	X	X
Total Dissolved Solids	X	FS	X	FS	X	X	X

San Jacinto-Brazos Coastal Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1101 Clear Creek Tidal	1101B Chigger Creek	1102 Clear Creek Above Tidal	1102A Cowart Creek	1102B Mary's Creek/ North Fork Mary's Creek	1103 Dickinson Bayou Tidal	1103A Bensons Bayou	1103B Bordens Gully	1103C Geisler Bayou	1103D Gum Bayou	1104 Dickinson Bayou Above Tidal	1105 Bastrop Bayou Tidal
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	**C**	**C**	**C**	**C**	NC	NC	NC	NC	NC	**C**	NC
Nitrite + Nitrate Nitrogen	NC	NC	**C**	NC	NC	NC	NC	NC	NC	NC	NC	NC
Orthophosphorus	NC	NA	**C**	NA	NA	NC	NA	NA	NA	NA	NC	NC
Total Phosphorus	NC	NA	**C**	NA	NA	NC	NA	NA	NA	NA	NC	NC
Algal Growth												
Chlorophyll *a*	NC	NA	NC	NA	NA	NC	NA	NA	NA	NA	NC	NC
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X

San Jacinto-Brazos Coastal Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1107 Chocolate Bayou Tidal	1108 Chocolate Bayou Above Tidal	1109 Oyster Creek Tidal	1110 Oyster Creek Above Tidal	1111 Old Brazos River Channel Tidal	1113 Armand Bayou Tidal	1113A Armand Bayou Above Tidal
WATER QUALITY CONCERNS							
Sediment Contaminants	NA	NA	NA	NA	**C**	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NC	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment							
Ammonia Nitrogen	NC	NC	NC	NC	NC	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NC	NC	NA
Orthophosphorus	NC	NC	NC	NC	NC	NC	NA
Total Phosphorus	NC	NC	NC	NC	NC	NC	NA
Algal Growth							
Chlorophyll *a*	NC	NC	NC	NC	NC	**C**	NA
Public Water Supply							
Finished Water: Chloride	X	X	X	NC	X	X	X
Finished Water: Sulfate	X	X	X	NC	X	X	X
Finished Water: TDS	X	X	X	NC	X	X	X
Surface Water: Chloride	X	X	X	NC	X	X	X
Surface Water: Sulfate	X	X	X	NC	X	X	X
Surface Water: TDS	X	X	X	NC	X	X	X

Brazos River Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Brazos River Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1201 Brazos River Tidal	1202 Brazos River Below Navasota River	1202H Allen's Creek	1202I Bessie's Creek	1202J Big Creek	1202K Mill Creek	1203 Whitney Lake	1203A Steele Creek	1204 Brazos River Below Lake Granbury	1205 Lake Granbury	1206 Brazos River Below Possum Kingdom Lake	1206D Palo Pinto Creek below Palo Pinto Reservoir
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	**NS**	NA	**NS**	FS	FS	NA	FS	FS	FS	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	X	X	X	X	FS	X	X	FS	X	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	FS	FS	FS	NA	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	X	X	X	X	FS	X	FS	FS	FS	X
pH	FS	FS	X	X	X	X	FS	X	FS	FS	FS	X
Chloride	X	FS	X	X	X	X	FS	X	FS	FS	FS	X
Sulfate	X	FS	X	X	X	X	FS	X	FS	FS	FS	X
Total Dissolved Solids	X	FS	X	X	X	X	FS	X	FS	FS	FS	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1207 Possum Kingdom Lake	1208 Brazos River Above Possum Kingdom Lake	1209 Navasota River Below Lake Limestone	1209A Country Club Lake	1209B Fin Feather Lake	1209C Carters Creek	1209D Country Club Branch	1209G Cedar Creek	1209H Duck Creek	1209I Gibbons Creek	1209J Shepherd Creek	1209K Steele Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	**NS**	NA	NA	**NS**	NA	**NS**	FS	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	FS	X	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	NA	FS	NA	FS	FS	**NS**	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	FS	X	X	X	X	X	X	X	X	X
pH	FS	FS	FS	X	X	X	X	X	X	X	X	X
Chloride	FS	FS	FS	X	X	X	X	X	X	X	X	X
Sulfate	FS	FS	FS	X	X	X	X	X	X	X	X	X
Total Dissolved Solids	FS	FS	FS	X	X	X	X	X	X	X	X	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1210 Lake Mexia	1210A Navasota River above Lake Mexia	1211 Yegua Creek	1211A Davidson Creek	1212 Somerville Lake	1212A Middle Yegua Creek	1212B East Yegua Creek	1213 Little River	1214 San Gabriel River	1215 Lampasas River Below Stillhouse Hollow Lake	1216 Stillhouse Hollow Lake	1217 Lampasas River Above Stillhouse Hollow Lake
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	**NS**	FS	**NS**	FS	FS	**NS**	FS	FS	FS	FS	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	FS	X	FS	X	X	FS	FS	FS	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	X	FS	X	FS	X	X	FS	FS	FS	FS	FS
pH	FS	X	FS	X	**PS**	X	X	FS	FS	FS	FS	FS
Chloride	FS	X	FS	X	FS	X	X	FS	FS	FS	FS	FS
Sulfate	FS	X	FS	X	FS	X	X	FS	FS	FS	FS	FS
Total Dissolved Solids	FS	X	FS	X	FS	X	X	FS	FS	FS	FS	FS

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1217A Rocky Creek	1217B Sulphur Creek	1217C Simms Creek	1218 Nolan Creek/ South Nolan Creek	1219 Leon River Below Belton Lake	1220 Belton Lake	1220A Cowhouse Creek	1221 Leon River Below Proctor Lake	1221A Resley Creek	1221B South Leon River	1222 Proctor Lake	1222A Duncan Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	**NS**	NA	FS	FS	**NS**	NA	FS	FS	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	FS	FS	X	FS	X	X	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	NA	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	FS	FS	FS	X	FS	X	X	FS	X
pH	X	X	X	FS	FS	FS	X	FS	X	X	FS	X
Chloride	X	X	X	FS	FS	FS	X	FS	X	X	FS	X
Sulfate	X	X	X	FS	FS	FS	X	FS	X	X	FS	X
Total Dissolved Solids	X	X	X	FS	FS	FS	X	FS	X	X	FS	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1222B Rush-Copperas Creek	1222**C** Sabana River	1223 Leon River Below Leon Reservoir	1224 Leon Reservoir	1225 Waco Lake	1225A Hog Creek	1226 North Bosque River	1226A Duffau Creek	1226B Green Creek	1226**C** Meridian Creek	1226D Neils Creek	1226E Indian Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	NA	FS	FS	FS	FS	**NS**	FS	FS	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	FS	FS	FS	X	FS	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	NA	FS	NA	FS	FS	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	FS	NA	FS	X	FS	X	X	X	X	X
pH	X	X	FS	NA	FS	X	FS	X	X	X	X	X
Chloride	X	X	FS	FS	FS	X	FS	X	X	X	X	X
Sulfate	X	X	FS	FS	FS	X	FS	X	X	X	X	X
Total Dissolved Solids	X	X	FS	FS	FS	X	FS	X	X	X	X	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1226F Sims Creek	1226G Spring Creek	1227 Nolan River	1228 Lake Pat Cleburne	1229 Paluxy River /North Paluxy River	1230 Lake Palo Pinto	1231 Lake Graham	1232 Clear Fork Brazos River	1232A California Creek	1232B Deadman Creek	1233 Hubbard Creek Reservoir	1234 Lake Cisco
DESIGNATED USE SUPPORT												
Contact Recreation Use	**NS**	FS	**NS**	NA	FS	NA	NA	FS	FS	FS	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	FS	FS	FS	FS	X	X	X	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	FS	NA	NA	FS	FS	FS	FS	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	FS	NA	FS	NA	NA	FS	X	X	FS	NA
pH	X	X	FS	NA	FS	NA	NA	FS	X	X	FS	NA
Chloride	X	X	FS	NA	FS	NA	NA	FS	X	X	FS	NA
Sulfate	X	X	**NS**	NA	FS	NA	NA	FS	X	X	FS	NA
Total Dissolved Solids	X	X	FS	NA	FS	NA	NA	FS	X	X	FS	NA

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1235 Lake Stamford	1236 Fort Phantom Hill Reservoir	1237 Lake Sweetwater	1238 Salt Fork Brazos River	1239 White River	1240 White River Lake	1240A White River above White River Reservoir	1241 Double Mountain Fork Brazos River	1241A N. Fork Double Mtn. Fork Brazos River	1242 Brazos River Above Navasota River	1242A Marlin City Lake System	1242D Thompson Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	NA	NA	FS	NA	FS	NA	FS	FS	**NS**	NA	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	FS	X	FS	FS	X	X	X	FS	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	NA	NA	NA	FS	NA	FS	NA	FS	FS	FS	NA	**PS**
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	NA	NA	NA	FS	X	FS	X	FS	X	FS	X	X
pH	NA	NA	NA	FS	X	FS	X	FS	X	FS	X	X
Chloride	NA	NA	NA	**NS**	X	**NS**	X	FS	X	FS	X	X
Sulfate	NA	NA	NA	FS	X	FS	X	FS	X	FS	X	X
Total Dissolved Solids	NA	NA	NA	**NS**	X	FS	X	FS	X	FS	X	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1242E Little Brazos River	1242F Pond Creek	1242I Campbells Creek	1242J Deer Creek	1242K Mud Creek	1242L Pin Oak Creek	1242M Spring Creek	1242N Tehuacana Creek	1242O Walnut Creek	1242P Big Creek	1243 Salado Creek	1244 Brushy Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	**NS**	FS	**NS**	**NS**	**NS**	**NS**	FS	**NS**	FS	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	X	X	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	X	X	X	X	X	X	FS	FS
pH	X	X	X	X	X	X	X	X	X	X	FS	FS
Chloride	X	X	X	X	X	X	X	X	X	X	FS	FS
Sulfate	X	X	X	X	X	X	X	X	X	X	FS	FS
Total Dissolved Solids	X	X	X	X	X	X	X	X	X	X	FS	FS

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1244A Brushy Creek Above South Brushy Creek	1245 Upper Oyster Creek	1246 Middle Bosque/South Bosque River	1246D Tonk Creek	1246E Wasp Creek	1247 Granger Lake	1247A Willis Creek	1248 San Gabriel/North Fork San Gabriel River	1248A Berry Creek	1248B Huddleston Branch	1248C Mankins Branch	1249 Lake Georgetown
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	**NS**	FS	FS	**NS**	FS	**NS**	FS	FS	NA	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	FS	X	X	X	FS	X	FS	X	X	X	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	NA	NA	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	FS	FS	X	X	FS	X	FS	X	X	X	FS
pH	X	FS	FS	X	X	FS	X	FS	X	X	X	FS
Chloride	X	FS	FS	X	X	FS	X	FS	X	X	X	FS
Sulfate	X	FS	FS	X	X	FS	X	FS	X	X	X	FS
Total Dissolved Solids	X	FS	FS	X	X	FS	X	**NS**	X	X	X	FS

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1250 South Fork San Gabriel River	1251 North Fork San Gabriel River	1252 Lake Limestone	1253 Navasota River Below Lake Mexia	1254 Aquilla Reservoir	1255 Upper North Bosque River	1255A Goose Branch	1255B North Fork Upper North Bosque River	1255C Scarborough Creek	1255D South Fork North Bosque River	1255E Unnamed tributary of Goose Branch	1255F Unnamed tributary of Scarborough Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	NA	FS	FS	FS	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	FS	FS	FS	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	FS	FS	FS	FS	X	X	X	X	X	X
pH	FS	FS	FS	FS	FS	FS	X	X	X	X	X	X
Chloride	FS	FS	FS	FS	FS	FS	X	X	X	X	X	X
Sulfate	FS	FS	FS	FS	FS	FS	X	X	X	X	X	X
Total Dissolved Solids	FS	FS	FS	FS	FS	FS	X	X	X	X	X	X

Brazos River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1255G Woodhollow Branch	1256 Brazos River/Lake Brazos	1256A Aquilla Creek	1257 Brazos River Below Lake Whitney
DESIGNATED USE SUPPORT				
Contact Recreation Use	**NS**	FS	FS	FS
Noncontact Recreation Use	X	X	X	X
Public Water Supply Use	X	FS	X	FS
Aquatic Life Use				
Dissolved Oxygen grab min	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA
Habitat	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA
Fish Consumption Use				
Advisories and Closures	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA
GENERAL USE SUPPORT				
Water Temperature	X	FS	X	FS
pH	X	FS	X	FS
Chloride	X	FS	X	FS
Sulfate	X	FS	X	FS
Total Dissolved Solids	X	FS	X	FS

Brazos River Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1201 Brazos River Tidal	1202 Brazos River Below Navasota River	1202H Allen's Creek	1202I Bessie's Creek	1202J Big Creek	1202K Mill Creek	1203 Whitney Lake	1203A Steele Creek	1204 Brazos River Below Lake Granbury	1205 Lake Granbury	1206 Brazos River Below Possum Kingdom Lake	1206D Palo Pinto Creek below Palo Pinto Reservoir
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NA	NA	NA	NC	NA	NA	NC	NA	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NA	NC	NC	**C**	NA	NC	NC	NC	NC
Orthophosphorus	NC	NC	**C**	NA	NC	NC	NC	NA	NC	NC	NC	NC
Total Phosphorus	NC	NC	NA	NA	NA	NC	NA	NA	NA	NA	NC	NA
Algal Growth												
Chlorophyll *a*	NC	**C**	NA	NA	NA	NC	NA	NA	NA	NA	NC	NA
Public Water Supply												
Finished Water: Chloride	NC	NC	X	X	X	X	NC	X	X	NC	X	NC
Finished Water: Sulfate	NC	NC	X	X	X	X	NC	X	X	NC	X	NC
Finished Water: TDS	NC	NC	X	X	X	X	NC	X	X	NC	X	NC
Surface Water: Chloride	NA	NC	X	X	X	X	**C**	X	X	**C**	X	NC
Surface Water: Sulfate	NA	NC	X	X	X	X	NC	X	X	NC	X	**C**
Surface Water: TDS	NA	NC	X	X	X	X	NC	X	X	**C**	X	NC

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1207 Possum Kingdom Lake	1208 Brazos River Above Possum Kingdom Lake	1209 Navasota River Below Lake Limestone	1209A Country Club Lake	1209B Fin Feather Lake	1209C Carters Creek	1209D Country Club Branch	1209G Cedar Creek	1209H Duck Creek	1209I Gibbons Creek	1209J Shepherd Creek	1209K Steele Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	**C**	**C**	NC	**C**	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NA	NA	**C**	NA	NC	NC	NC	NC	NC
Orthophosphorus	NC	NC	NC	NA	NA	**C**	NA	NC	NC	NC	NC	NC
Total Phosphorus	NA	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	**C**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	**C**	X	NC	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	**C**	X	NC	X	X	X	X	X	X	X	X	X
Finished Water: TDS	**C**	X	NC	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	**C**	X	NC	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	**C**	X	NC	X	X	X	X	X	X	X	X	X
Surface Water: TDS	**C**	X	NC	X	X	X	X	X	X	X	X	X

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1210 Lake Mexia	1210A Navasota River above Lake Mexia	1211 Yegua Creek	1211A Davidson Creek	1212 Somerville Lake	1212A Middle Yegua Creek	1212B East Yegua Creek	1213 Little River	1214 San Gabriel River	1215 Lampasas River Below Stillhouse Hollow Lake	1216 Stillhouse Hollow Lake	1217 Lampasas River Above Stillhouse Hollow Lake
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NA	NA	NA	NA	NA	NA	NA	NC	NC	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Total Phosphorus	**C**	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NC	NA	NA	NA	NA	NA	NA	NA	NC	NC	NA	NA
Public Water Supply												
Finished Water: Chloride	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X
Finished Water: Sulfate	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X
Finished Water: TDS	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X
Surface Water: Chloride	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X
Surface Water: Sulfate	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X
Surface Water: TDS	NC	X	NC	X	NC	X	X	NC	NC	NC	NC	X

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1217A Rocky Creek	1217B Sulphur Creek	1217C Simms Creek	1218 Nolan Creek/ South Nolan Creek	1219 Leon River Below Belton Lake	1220 Belton Lake	1220A Cowhouse Creek	1221 Leon River Below Proctor Lake	1221A Resley Creek	1221B South Leon River	1222 Proctor Lake	1222A Duncan Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	NA	NC	NC	NC	NC	NC	NA	NC	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	**C**	NC	**C**	NC	NC	NA	NC	NC	NA
Orthophosphorus	NC	NC	NC	**C**	NC	NC	NC	NC	NA	NC	NC	NA
Total Phosphorus	NA	NA	NA	**C**	NA	NC	NA	NC	NA	NC	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NC	NA	NC	NA	**C**	NA	NC	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	NC	NC	X	NC	X	X	NC	X
Finished Water: Sulfate	X	X	X	X	NC	NC	X	NC	X	X	NC	X
Finished Water: TDS	X	X	X	X	NC	NC	X	NC	X	X	NC	X
Surface Water: Chloride	X	X	X	X	NC	NC	X	NC	X	X	NC	X
Surface Water: Sulfate	X	X	X	X	NC	NC	X	NC	X	X	NC	X
Surface Water: TDS	X	X	X	X	NC	NC	X	NC	X	X	NC	X

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1222B Rush-Copperas Creek	1222C Sabana River	1223 Leon River Below Leon Reservoir	1224 Leon Reservoir	1225 Waco Lake	1225A Hog Creek	1226 North Bosque River	1226A Duffau Creek	1226B Green Creek	1226C Meridian Creek	1226D Neils Creek	1226E Indian Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	**C**	NC	NC	NC	NC	NC	NC	**C**
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Total Phosphorus	NA	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Algal Growth												
Chlorophyll *a*	NA	NC	NC	NC	**C**	NC	**C**	NC	**C**	NC	NC	NA
Public Water Supply												
Finished Water: Chloride	X	X	NC	NC	NC	X	NC	X	X	X	X	X
Finished Water: Sulfate	X	X	NC	NC	NC	X	NC	X	X	X	X	X
Finished Water: TDS	X	X	NC	NC	NC	X	NC	X	X	X	X	X
Surface Water: Chloride	X	X	NC	NC	NC	X	NC	X	X	X	X	X
Surface Water: Sulfate	X	X	NC	NC	NC	X	NC	X	X	X	X	X
Surface Water: TDS	X	X	NC	NC	NC	X	NC	X	X	X	X	X

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1226F Sims Creek	1226G Spring Creek	1227 Nolan River	1228 Lake Pat Cleburne	1229 Paluxy River /North Paluxy River	1230 Lake Palo Pinto	1231 Lake Graham	1232 Clear Fork Brazos River	1232A California Creek	1232B Deadman Creek	1233 Hubbard Creek Reservoir	1234 Lake Cisco
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NA	NC	NA	NA	NC	NA	NC	NC	NA
Nitrite + Nitrate Nitrogen	NC	NC	**C**	NA	NC	NA	NA	**C**	**C**	**C**	NC	NA
Orthophosphorus	NC	NC	**C**	NA	NC	NA	NA	**C**	NC	**C**	NC	NA
Total Phosphorus	NC	NC	NC	NA	NC	NA	NA	NC	NA	**C**	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NC	NA	NC	NA	NA	NC	NA	NC	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	NC	NC	NC	NC	X	X	X	NC	NC
Finished Water: Sulfate	X	X	X	NC	NC	NC	NC	X	X	X	NC	NC
Finished Water: TDS	X	X	X	NC	NC	NC	NC	X	X	X	NC	NC
Surface Water: Chloride	X	X	X	NA	NC	NA	NA	X	X	X	NC	NA
Surface Water: Sulfate	X	X	X	NA	NC	NA	NA	X	X	X	NC	NA
Surface Water: TDS	X	X	X	NA	NC	NA	NA	X	X	X	NC	NA

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1235 Lake Stamford	1236 Fort Phantom Hill Reservoir	1237 Lake Sweetwater	1238 Salt Fork Brazos River	1239 White River	1240 White River Lake	1240A White River above White River Reservoir	1241 Double Mountain Fork Brazos River	1241A N. Fork Double Mtn. Fork Brazos River	1242 Brazos River Above Navasota River	1242A Marlin City Lake System	1242D Thompson Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	NA	**C**	NA	NA	NA	NC	NC	NC	NA	NA
Nitrite + Nitrate Nitrogen	NA	NA	NA	NC	NA	NC	NA	NC	**C**	NC	NA	**C**
Orthophosphorus	NA	NA	NA	NC	NA	NC	NA	NC	NA	NC	NA	**C**
Total Phosphorus	NA	NA	NA	NC	NA	NA	NA	NC	NC	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NC	NA	NA	NA	NC	**C**	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	**C**	NC	NC	X	NC	NC	X	X	X	NC	NC	X
Finished Water: Sulfate	**C**	NC	**C**	X	NC	NC	X	X	X	NC	NC	X
Finished Water: TDS	**C**	NC	NC	X	NC	NC	X	X	X	NC	NC	X
Surface Water: Chloride	NA	NA	NA	X	NA	NC	X	X	X	NC	NC	X
Surface Water: Sulfate	NA	NA	NA	X	NA	NC	X	X	X	NC	NC	X
Surface Water: TDS	NA	NA	NA	X	NA	NC	X	X	X	NC	NC	X

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1242E Little Brazos River	1242F Pond Creek	1242I Campbells Creek	1242J Deer Creek	1242K Mud Creek	1242L Pin Oak Creek	1242M Spring Creek	1242N Tehuacana Creek	1242O Walnut Creek	1242P Big Creek	1243 Salado Creek	1244 Brushy Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**	**C**
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**
Total Phosphorus	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	X	X	X	NC	NC
Finished Water: Sulfate	X	X	X	X	X	X	X	X	X	X	NC	NC
Finished Water: TDS	X	X	X	X	X	X	X	X	X	X	NC	NC
Surface Water: Chloride	X	X	X	X	X	X	X	X	X	X	NC	NC
Surface Water: Sulfate	X	X	X	X	X	X	X	X	X	X	NC	NC
Surface Water: TDS	X	X	X	X	X	X	X	X	X	X	NC	NC

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1244A Brushy Creek Above South Brushy Creek	1245 Upper Oyster Creek	1246 Middle Bosque/South Bosque River	1246D Tonk Creek	1246E Wasp Creek	1247 Granger Lake	1247A Willis Creek	1248 San Gabriel/North Fork San Gabriel River	1248A Berry Creek	1248B Huddleston Branch	1248C Mankins Branch	1249 Lake Georgetown
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	**C**	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NC	NC	NC	NC	NA	NC	NC	NA	NA	NC
Nitrite + Nitrate Nitrogen	NC	NC	**C**	**C**	**C**	**C**	**C**	NC	NC	NA	NA	NC
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NC	NA	NA	NC
Total Phosphorus	NA	NC	NC	NC	NC	NC	NA	NC	NC	NA	NA	NC
Algal Growth												
Chlorophyll *a*	NA	NC	NC	NC	NC	NC	NA	NC	NC	NA	NA	NC
Public Water Supply												
Finished Water: Chloride	X	NC	X	X	X	NC	X	NC	X	X	X	NC
Finished Water: Sulfate	X	NC	X	X	X	NC	X	NC	X	X	X	NC
Finished Water: TDS	X	NC	X	X	X	NC	X	NC	X	X	X	NC
Surface Water: Chloride	X	NC	X	X	X	NC	X	NC	X	X	X	NC
Surface Water: Sulfate	X	NC	X	X	X	NC	X	NC	X	X	X	NC
Surface Water: TDS	X	NC	X	X	X	NC	X	NC	X	X	X	NC

Brazos River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1250 South Fork San Gabriel River	1251 North Fork San Gabriel River	1252 Lake Limestone	1253 Navasota River Below Lake Mexia	1254 Aquilla Reservoir	1255 Upper North Bosque River	1255A Goose Branch	1255B North Fork Upper North Bosque River	1255**C** Scarborough Creek	1255D South Fork North Bosque River	1255E Unnamed tributary of Goose Branch	1255F Unnamed tributary of Scarborough Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NA	**C**	NC	**C**	**C**	**C**	**C**	**C**	**C**	NC
Nitrite + Nitrate Nitrogen	NC	NC	**C**	NC	**C**	**C**	**C**	NC	NC	NC	NC	NC
Orthophosphorus	NC	NC	NC	NC	NC	**C**	**C**	**C**	**C**	NC	**C**	NC
Total Phosphorus	NC	NC	NA	NC	NC	**C**	**C**	NC	**C**	NC	**C**	NC
Algal Growth												
Chlorophyll *a*	NC	NC	NA	**C**	NC	**C**	NA	**C**	NA	**C**	NA	NA
Public Water Supply												
Finished Water: Chloride	NC	NC	NC	NC	NC	X	X	X	X	X	X	X
Finished Water: Sulfate	NC	NC	NC	NC	NC	X	X	X	X	X	X	X
Finished Water: TDS	NC	NC	NC	NC	NC	X	X	X	X	X	X	X
Surface Water: Chloride	NC	NC	NC	NC	NC	X	X	X	X	X	X	X
Surface Water: Sulfate	NC	NC	NC	NC	NC	X	X	X	X	X	X	X
Surface Water: TDS	NC	NC	NC	NC	NC	X	X	X	X	X	X	X

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1255G Woodhollow Branch	1256 Brazos River/Lake Brazos	1256A Aquilla Creek	1257 Brazos River Below Lake Whitney
WATER QUALITY CONCERNS				
Sediment Contaminants	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA
Narrative	NC	NC	NC	NC
Nutrient Enrichment				
Ammonia Nitrogen	NC	NC	NA	NA
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC
Orthophosphorus	NC	NC	NC	NC
Total Phosphorus	NC	NC	NA	NA
Algal Growth				
Chlorophyll *a*	NA	NC	NA	NA
Public Water Supply				
Finished Water: Chloride	X	NC	X	NC
Finished Water: Sulfate	X	NC	X	NC
Finished Water: TDS	X	NC	X	NC
Surface Water: Chloride	X	NC	X	NC
Surface Water: Sulfate	X	NC	X	NC
Surface Water: TDS	X	NC	X	NC

Brazos - Colorado Coastal Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Brazos-Colorado Coastal Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1301 San Bernard River Tidal	1302 San Bernard River Above Tidal	1304 Caney Creek Tidal	1304A Linnville Bayou	1305 Caney Creek Above Tidal
DESIGNATED USE SUPPORT					
Contact Recreation Use	FS	**NS**	FS	FS	**NS**
Noncontact Recreation Use	X	X	X	X	X
Public Water Supply Use	X	FS	X	X	X
Aquatic Life Use					
Dissolved Oxygen grab min	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	FS	NA
Organics in water	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA
Fish Consumption Use					
Advisories and Closures	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	FS	NA
GENERAL USE SUPPORT					
Water Temperature	FS	FS	FS	X	FS
pH	FS	FS	FS	X	FS
Chloride	X	FS	X	X	FS
Sulfate	X	FS	X	X	FS
Total Dissolved Solids	X	FS	X	X	FS

Brazos-Colorado Coastal Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1301 San Bernard River Tidal	1302 San Bernard River Above Tidal	1304 Caney Creek Tidal	1304A Linnville Bayou	1305 Caney Creek Above Tidal
WATER QUALITY CONCERNS					
Sediment Contaminants	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA
Narrative	NC	NC	**C**	NC	**C**
Nutrient Enrichment					
Ammonia Nitrogen	NC	NC	NC	**C**	NC
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NC
Orthophosphorus	NC	NC	NC	NC	NC
Total Phosphorus	NC	NC	NC	NC	NC
Algal Growth					
Chlorophyll *a*	NC	NC	NC	NC	NC
Public Water Supply					
Finished Water: Chloride	X	NC	X	X	X
Finished Water: Sulfate	X	NC	X	X	X
Finished Water: TDS	X	NC	X	X	X
Surface Water: Chloride	X	NC	X	X	X
Surface Water: Sulfate	X	NC	X	X	X
Surface Water: TDS	X	NC	X	X	X

Colorado River Basin
Summary Tables

This Page
Intentionally Left Blank

Basin Tabular Summaries

For each basin, there are two documents: Tabular Summary of Use Support and Tabular Summary of Water Quality Concerns

Tabular Summary of Use Support

This series of tables provides a quick, detailed reference to water quality status within a basin. The summary identifies the indicators used to assess support of designated uses. For each indicator, support codes are used to identify the level of attainment as fully supporting (FS), partial supporting (PS), not supporting (NS), not assessed (NA), and not applicable (X). Indicators that contribute to partially supporting and not supporting uses are in bold type.

Tabular Summary of Water Quality Concerns

This series of tables provides a quick, detailed reference to water quality problems within a basin. The summary identifies the indicators used to assess water quality concerns. For each indicator, the presence of a water quality problem is identified as a concern (C), no concern (NC), threatened (TH), not assessed (NA), or not applicable (X). Indicators that contribute to concerns are in bold type.

T is Page
Intentionally Left Blan

Colorado River Basin Tabular Summary of Use Support

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1401 Colorado River Tidal	1402 Colorado River Below La Grange	1402A Cummins Creek	1402**C** Buckners Creek	1402F Blue Creek	1402G Fayette Reservoir	1402H Skull Creek	1403 Lake Austin	1403A Bull Creek	1403B West Bull Creek	1403**C** Cow Fork Bull Creek	1403D Barrow Preserve Tributary
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	NA	NA	FS	FS	FS	FS	NA	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	FS	X	X	X	FS	X	FS	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	NA	FS	NA	FS	FS	FS	NA	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	**NS**	NA	NA	NA	NA	NA	**NS**	FS	FS	NA
Fish Community	NA	NA	**NS**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	FS	X	X	X	X	X	FS	X	X	X	X
pH	FS	FS	X	X	X	X	X	FS	X	X	X	X
Chloride	X	FS	X	X	X	X	X	FS	X	X	X	X
Sulfate	X	FS	X	X	X	X	X	FS	X	X	X	X
Total Dissolved Solids	X	FS	X	X	X	X	X	FS	X	X	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1403E Stillhouse Hollow	1403F Unnamed Tributary to Bull Creek	1403G Tanglewood Tributary to Bull Creek	1403H Unnamed Tributary to Bull Creek	1403I Unnamed Tributary to Bull Creek	1403J Spicewood Tributary to Shoal Creek	1403K Taylor Slough South	1403L Unnamed Tributary to Lake Austin	1403M Turkey Creek	1403N Panther Hollow Creek	1403O Cuernavaca Creek	1403P Bee Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	FS	FS	**NS**	**NS**	FS	NA	NA	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	FS	FS	FS	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	FS	FS	NA	NA	NA	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	X	X	X	X	X	X	X	X
pH	X	X	X	X	X	X	X	X	X	X	X	X
Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Total Dissolved Solids	X	X	X	X	X	X	X	X	X	X	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1403Q Bear Creek	1403R Unnamed tributary to Lake Austin	1404 Lake Travis	1404A Hamilton Creek	1404B Cow Creek	1404C Long Hollow Creek	1405 Marble Falls Lake	1406 Lake Lyndon B. Johnson	1406A Sandy Creek	1407 Inks Lake	1408 Lake Buchanan	1409 Colorado River Above Lake Buchanan
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	FS	FS	NA	NA	NA	FS	FS	FS	FS	FS	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS
Aquatic Life Use												
Dissolved Oxygen grab min	NA	NA	FS	NA	NA	NA	FS	FS	FS	**PS**	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FS
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FS
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS
pH	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS
Chloride	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS
Sulfate	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS
Total Dissolved Solids	X	X	FS	X	X	X	FS	FS	X	FS	FS	FS

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1410 Colorado River Below O. H. Ivie Reservoir	1411 E. V. Spence Reservoir	1412 Colorado River Below Lake J. B. Thomas	1412A Lake Colorado City	1412B Beals Creek	1412C Deep Creek	1413 Lake J. B. Thomas	1414 Pedernales River	1414B Cypress Creek	1414C Live Oak Creek	1414D Miller Creek	1415 Llano River
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	NA	NA	NA	NA	NA	NA	FS	FS	NA	NA	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	FS	X	FS	X	X	FS	FS	X	X	X	FS
Aquatic Life Use												
Dissolved Oxygen grab min	FS	NA	FS	NA	FS	FS	NA	FS	FS	NA	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	NA	FS	X	X	X	NA	FS	X	X	X	FS
pH	FS	NA	FS	X	X	X	NA	FS	X	X	X	FS
Chloride	FS	NA	FS	X	X	X	NA	FS	X	X	X	FS
Sulfate	FS	NA	FS	X	X	X	NA	FS	X	X	X	FS
Total Dissolved Solids	FS	NA	FS	X	X	X	NA	FS	X	X	X	FS

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1415A Johnson Fork Creek	1416 San Saba River	1416A Brady Creek	1417 Lower Pecan Bayou	1418 Lake Brownwood	1418A Hords Creek	1418B Jim Ned Creek	1419 Lake Coleman	1420 Pecan Bayou Above Lake Brownwood	1421 Concho River	1421A Dry Hollow Creek	1421B Kickapoo Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	FS	FS	FS	NA	FS	NA	NA	FS	FS	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	FS	X	X	FS	X	X	FS	FS	FS	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	NA	FS	FS	FS	NA	FS	NA	NA	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	FS	NA	NA	NA	NA	NA	NA	NA	**NS**	NA	NA
Fish Community	NA	FS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	FS	FS	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	FS	X	FS	NA	X	X	NA	FS	FS	X	X
pH	X	FS	X	FS	NA	X	X	NA	FS	FS	X	X
Chloride	X	FS	X	FS	FS	X	X	FS	FS	FS	X	X
Sulfate	X	FS	X	FS	FS	X	X	FS	FS	FS	X	X
Total Dissolved Solids	X	FS	X	FS	FS	X	X	FS	FS	FS	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1421**C** Lipan Creek	1421D Little Concho River	1422 Lake Nasworthy	1423 Twin Buttes Reservoir	1423A Spring Creek	1423B Dove Creek	1424 Middle Concho/South Concho River	1425 O. C. Fisher Lake	1425A North Concho River	1426 Colorado River Below E. V. Spence Reservoir	1426A Oak Creek Reservoir	1426B Elm Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	NA	FS	NA	FS	NA	FS	NA	NA	FS	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	FS	FS	X	X	FS	FS	X	FS	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	NA	FS	FS	NA	FS	NA	FS	NA	NA	FS	NA	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	FS	NA	X	X	FS	NA	X	FS	X	X
pH	X	X	FS	NA	X	X	FS	NA	X	FS	X	X
Chloride	X	X	FS	FS	X	X	FS	**NS**	X	**NS**	X	X
Sulfate	X	X	FS	FS	X	X	FS	FS	X	FS	X	X
Total Dissolved Solids	X	X	FS	FS	X	X	FS	**NS**	X	**NS**	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1427 Onion Creek	1427A Slaughter Creek	1427B Williamson Creek	1427C Bear Creek	1427D Boggy Creek	1427E Marble Creek	1427F Rinard Creek	1427G Unnamed Tributary to Slaughter Creek	1428 Colorado River Below Town Lake	1428A Boggy Creek	1428B Walnut Creek	1428C Gilleland Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	FS	FS	FS	NA	NA	FS	FS	NA	FS	NA	FS	**NS**
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	FS	X	X	X	X	X	X	X	FS	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	FS	FS	FS	NA	NA	FS	FS	NA	FS	NA	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	FS	**NS**	FS	NA	NA	NA	NA	NA	NA	NA	FS	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	FS	X	X	X	X	X	X	X	FS	X	X	X
pH	FS	X	X	X	X	X	X	X	FS	X	X	X
Chloride	FS	X	X	X	X	X	X	X	FS	X	X	X
Sulfate	FS	X	X	X	X	X	X	X	FS	X	X	X
Total Dissolved Solids	FS	X	X	X	X	X	X	X	FS	X	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1428D Little Walnut Creek	1428E Fort Branch Creek	1428F Tannehill Branch Creek	1428G Wells Branch	1428H Carson Creek	1428I Decker Creek	1428J Harris Branch	1429 Town Lake	1429A Shoal Creek	1429B Eanes Creek	1429C Waller Creek	1429D East Bouldin Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	FS	X	X	X	X
Aquatic Life Use												
Dissolved Oxygen grab min	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	NA	FS	NA	NA	NA	NA	FS	NA	FS	NA	**NS**	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	FS	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	X	X	X	FS	X	X	X	X
pH	X	X	X	X	X	X	X	FS	X	X	X	X
Chloride	X	X	X	X	X	X	X	FS	X	X	X	X
Sulfate	X	X	X	X	X	X	X	FS	X	X	X	X
Total Dissolved Solids	X	X	X	X	X	X	X	FS	X	X	X	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1429E West Bouldin Creek	1429F Blunn Creek	1429G Harper's Branch	1429H Johnson Creek	1430 Barton Creek	1430A Barton Springs	1430B Tributaries to Barton Creek	1431 Mid Pecan Bayou	1432 Upper Pecan Bayou	1433 O. H. Ivie Reservoir	1434 Colorado River above La Grange	1434B Cedar Creek
DESIGNATED USE SUPPORT												
Contact Recreation Use	NA	NA	NA	NA	FS	FS	FS	FS	FS	NA	FS	FS
Noncontact Recreation Use	X	X	X	X	X	X	X	X	X	X	X	X
Public Water Supply Use	X	X	X	X	X	X	X	X	FS	FS	FS	X
Aquatic Life Use												
Dissolved Oxygen grab min	NA	NA	NA	NA	FS	FS	FS	FS	FS	FS	FS	FS
Dissolved Oxygen 24-hour avg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen 24-hour min	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Organics in water	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Water Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment Toxicity tests	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macrobenthos Community	FS	FS	NA	NA	FS	NA	FS	NA	NA	NA	NA	NA
Fish Community	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Consumption Use												
Advisories and Closures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Human Health Criteria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GENERAL USE SUPPORT												
Water Temperature	X	X	X	X	FS	X	X	FS	FS	FS	FS	X
pH	X	X	X	X	FS	X	X	FS	FS	NA	FS	X
Chloride	X	X	X	X	FS	X	X	FS	FS	NA	FS	X
Sulfate	X	X	X	X	FS	X	X	FS	FS	NA	FS	X
Total Dissolved Solids	X	X	X	X	FS	X	X	FS	FS	NA	NA	X

Colorado River Basin Tabular Summary of Use Support (continued)

Key to support codes FS = fully supporting PS = partially supporting NS = not supporting NA = not assessed X = not applicable	1434**C** Lake Bastrop
DESIGNATED USE SUPPORT	
Contact Recreation Use	FS
Noncontact Recreation Use	X
Public Water Supply Use	X
Aquatic Life Use	
Dissolved Oxygen grab min	FS
Dissolved Oxygen 24-hour avg	NA
Dissolved Oxygen 24-hour min	NA
Metals in water	NA
Organics in water	NA
Water Toxicity tests	NA
Sediment Toxicity tests	NA
Habitat	NA
Macrobenthos Community	NA
Fish Community	NA
Fish Consumption Use	
Advisories and Closures	NA
Human Health Criteria	NA
GENERAL USE SUPPORT	
Water Temperature	X
pH	X
Chloride	X
Sulfate	X
Total Dissolved Solids	X

Colorado River Basin Tabular Summary of Water Quality Concerns

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1401 Colorado River Tidal	1402 Colorado River Below La Grange	1402A Cummins Creek	1402C Buckners Creek	1402F Blue Creek	1402G Fayette Reservoir	1402H Skull Creek	1403 Lake Austin	1403A Bull Creek	1403B West Bull Creek	1403C Cow Fork Bull Creek	1403D Barrow Preserve Tributary
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NC	NA	NC	NA	NC	NC	NC	NA	NC
Nitrite + Nitrate Nitrogen	NC	NC	NC	NC	NA	NC	NA	NC	NC	NC	NA	**C**
Orthophosphorus	NC	NC	NC	NC	NA	NC	NA	NC	NC	NC	NA	NC
Total Phosphorus	NC	NC	NC	NC	NA	NC	NA	NC	NC	NC	NA	NC
Algal Growth												
Chlorophyll *a*	NC	NC	NC	**C**	NA	**C**	NA	NC	NC	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	NC	X	X	X	NC	X	NC	X	X	X	X
Finished Water: Sulfate	X	NC	X	X	X	NC	X	NC	X	X	X	X
Finished Water: TDS	X	NC	X	X	X	NC	X	NC	X	X	X	X
Surface Water: Chloride	X	NC	X	X	X	NC	X	NC	X	X	X	X
Surface Water: Sulfate	X	NC	X	X	X	NC	X	NC	X	X	X	X
Surface Water: TDS	X	NC	X	X	X	NC	X	NC	X	X	X	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1403E Stillhouse Hollow	1403F Unnamed Tributary to Bull Creek	1403G Tanglewood Tributary to Bull Creek	1403H Unnamed Tributary to Bull Creek	1403I Unnamed Tributary to Bull Creek	1403J Spicewood Tributary to Shoal Creek	1403K Taylor Slough South	1403L Unnamed Tributary to Lake Austin	1403M Turkey Creek	1403N Panther Hollow Creek	1403O Cuernavaca Creek	1403P Bee Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NC	NC	NC	NC	NC	NA	NA	NA	NC
Nitrite + Nitrate Nitrogen	**C**	NC	NC	NC	NC	**C**	**C**	NC	NA	NA	NA	NC
Orthophosphorus	NC	NC	NC	NC	NC	NC	NC	NC	NA	NA	NA	NC
Total Phosphorus	NC	NC	NC	NC	NC	NC	NA	NA	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	X	X	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	X	X	X	X	X	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1403Q Bear Creek	1403R Unnamed tributary to Lake Austin	1404 Lake Travis	1404A Hamilton Creek	1404B Cow Creek	1404**C** Long Hollow Creek	1405 Marble Falls Lake	1406 Lake Lyndon B. Johnson	1406A Sandy Creek	1407 Inks Lake	1408 Lake Buchanan	1409 Colorado River Above Lake Buchanan
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NC	NA	NA	NA	NC	NC	NC	**C**	NC	NC
Nitrite + Nitrate Nitrogen	NA	NC	NC	NA	NA	NA	NC	NC	NC	NC	NC	NC
Orthophosphorus	NA	NC	NC	NA	NA	NA	NC	NC	NC	NC	NC	NC
Total Phosphorus	NA	NA	NC	NA	NA	NA	NC	NC	NC	NC	NC	NC
Algal Growth												
Chlorophyll *a*	NA	NA	NC	NA	NA	NA	NC	NC	NC	NC	**C**	NC
Public Water Supply												
Finished Water: Chloride	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC
Finished Water: Sulfate	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC
Finished Water: TDS	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC
Surface Water: Chloride	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC
Surface Water: Sulfate	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC
Surface Water: TDS	X	X	NC	X	X	X	NC	NC	X	NC	NC	NC

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1410 Colorado River Below O. H. Ivie Reservoir	1411 E. V. Spence Reservoir	1412 Colorado River Below Lake J. B. Thomas	1412A Lake Colorado City	1412B Beals Creek	1412**C** Deep Creek	1413 Lake J. B. Thomas	1414 Pedernales River	1414B Cypress Creek	1414**C** Live Oak Creek	1414D Miller Creek	1415 Llano River
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NA	NC	NA	NA	NA	NA	NC	NC	NA	NA	NC
Nitrite + Nitrate Nitrogen	NC	NA	NC	NA	**C**	NA	NA	NC	NC	NA	NA	NC
Orthophosphorus	NC	NA	NC	NA	NA	NA	NA	NC	NC	NA	NA	NC
Total Phosphorus	NC	NA	NA	NA	NA	NA	NA	NC	NC	NA	NA	NC
Algal Growth												
Chlorophyll *a*	NC	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NC
Public Water Supply												
Finished Water: Chloride	NC	NA	X	NC	X	X	NC	NC	X	X	X	NC
Finished Water: Sulfate	NC	NA	X	**C**	X	X	NC	NC	X	X	X	NC
Finished Water: TDS	NC	NA	X	**C**	X	X	NC	NC	X	X	X	NC
Surface Water: Chloride	**C**	**C**	X	NA	X	X	NA	NC	X	X	X	NC
Surface Water: Sulfate	NC	**C**	X	NA	X	X	NA	NC	X	X	X	NC
Surface Water: TDS	NC	**C**	X	NA	X	X	NA	NC	X	X	X	NC

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1415A Johnson Fork Creek	1416 San Saba River	1416A Brady Creek	1417 Lower Pecan Bayou	1418 Lake Brownwood	1418A Hords Creek	1418B Jim Ned Creek	1419 Lake Coleman	1420 Pecan Bayou Above Lake Brownwood	1421 Concho River	1421A Dry Hollow Creek	1421B Kickapoo Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NC	NC	NC	NA	NC	NA	NC	NC	**C**	NA	NA
Nitrite + Nitrate Nitrogen	NA	NC	**C**	**C**	NA	NC	NA	NC	NC	**C**	**C**	**C**
Orthophosphorus	NA	NC	**C**	NC	NA	NC	NA	NC	NC	NC	NA	NA
Total Phosphorus	NA	NC	**C**	NC	NA	NC	NA	NC	NA	NC	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NC	**C**	**C**	NA	**C**	NA	NC	NA	**C**	NA	NA
Public Water Supply												
Finished Water: Chloride	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X
Finished Water: Sulfate	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X
Finished Water: TDS	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X
Surface Water: Chloride	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X
Surface Water: Sulfate	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X
Surface Water: TDS	X	NC	X	X	NC	X	X	NC	NC	**C**	X	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1421C Lipan Creek	1421D Little Concho River	1422 Lake Nasworthy	1423 Twin Buttes Reservoir	1423A Spring Creek	1423B Dove Creek	1424 Middle Concho/South Concho River	1425 O. C. Fisher Lake	1425A North Concho River	1426 Colorado River Below E. V. Spence Reservoir	1426A Oak Creek Reservoir	1426B Elm Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	**C**	NA	**C**	NA	NC	**C**	NA	**C**	NA	NA
Nitrite + Nitrate Nitrogen	NA	**C**	NC	NA	NC	NA	NC	NC	NA	NC	NA	**C**
Orthophosphorus	NA	NA	NC	NA	NC	NA	NC	NC	NA	NC	NA	NA
Total Phosphorus	NA	NA	NC	NA	NA	NA	NC	NA	NA	NC	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NC	NA	NA	NA	NC	NA	NA	**C**	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	NC	NC	X	X	NC	NC	X	NC	NA	X
Finished Water: Sulfate	X	X	NC	NC	X	X	NC	NC	X	NC	**C**	X
Finished Water: TDS	X	X	NC	NC	X	X	NC	NC	X	NC	NA	X
Surface Water: Chloride	X	X	**C**	NC	X	X	NC	**C**	X	**C**	NA	X
Surface Water: Sulfate	X	X	NC	NC	X	X	NC	NC	X	**C**	NA	X
Surface Water: TDS	X	X	NC	NC	X	X	NC	NC	X	**C**	NA	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1427 Onion Creek	1427A Slaughter Creek	1427B Williamson Creek	1427**C** Bear Creek	1427D Boggy Creek	1427E Marble Creek	1427F Rinard Creek	1427G Unnamed Tributary to Slaughter Creek	1428 Colorado River Below Town Lake	1428A Boggy Creek	1428B Walnut Creek	1428**C** Gilleland Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NC	NC	NC	NA	NA	NC	NC	NA	NC	NA	NC	NC
Nitrite + Nitrate Nitrogen	NC	NC	NC	NA	NA	NC	NC	NA	**C**	NA	**C**	**C**
Orthophosphorus	NC	NC	NC	NA	NA	NC	NC	NA	**C**	NA	NC	**C**
Total Phosphorus	NC	NC	NC	NA	NA	NC	NC	NA	NC	NA	**C**	NC
Algal Growth												
Chlorophyll *a*	NC	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NC
Public Water Supply												
Finished Water: Chloride	NC	X	X	X	X	X	X	X	NC	X	X	X
Finished Water: Sulfate	NC	X	X	X	X	X	X	X	NC	X	X	X
Finished Water: TDS	NC	X	X	X	X	X	X	X	NC	X	X	X
Surface Water: Chloride	NC	X	X	X	X	X	X	X	NC	X	X	X
Surface Water: Sulfate	NC	X	X	X	X	X	X	X	NC	X	X	X
Surface Water: TDS	NC	X	X	X	X	X	X	X	NC	X	X	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1428D Little Walnut Creek	1428E Fort Branch Creek	1428F Tannehill Branch Creek	1428G Wells Branch	1428H Carson Creek	1428I Decker Creek	1428J Harris Branch	1429 Town Lake	1429A Shoal Creek	1429B Eanes Creek	1429**C** Waller Creek	1429D East Bouldin Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**C**
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**C**	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA
Nitrite + Nitrate Nitrogen	NA	NA	NA	NA	NA	NA	NA	**C**	NA	NA	NA	NA
Orthophosphorus	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA
Total Phosphorus	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	NC	X	X	X	X
Finished Water: Sulfate	X	X	X	X	X	X	X	NC	X	X	X	X
Finished Water: TDS	X	X	X	X	X	X	X	NC	X	X	X	X
Surface Water: Chloride	X	X	X	X	X	X	X	NC	X	X	X	X
Surface Water: Sulfate	X	X	X	X	X	X	X	NC	X	X	X	X
Surface Water: TDS	X	X	X	X	X	X	X	NC	X	X	X	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1429E West Bouldin Creek	1429F Blunn Creek	1429G Harper's Branch	1429H Johnson Creek	1430 Barton Creek	1430A Barton Springs	1430B Tributaries to Barton Creek	1431 Mid Pecan Bayou	1432 Upper Pecan Bayou	1433 O. H. Ivie Reservoir	1434 Colorado River above La Grange	1434B Cedar Creek
WATER QUALITY CONCERNS												
Sediment Contaminants	NA	NA	NA	NA	**C**	**C**	NA	NA	NA	NA	NA	NA
Fish Tissue Contaminants	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Narrative	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Nutrient Enrichment												
Ammonia Nitrogen	NA	NA	NA	NA	NC	NC	NC	NC	NC	NA	NC	NC
Nitrite + Nitrate Nitrogen	NA	NA	NA	NA	NC	NC	NC	**C**	NC	NA	**C**	NC
Orthophosphorus	NA	NA	NA	NA	NC	NC	NC	**C**	NC	NA	NC	NC
Total Phosphorus	NA	NA	NA	NA	NC	NC	NC	**C**	NC	NA	NC	NC
Algal Growth												
Chlorophyll *a*	NA	NA	NA	NA	NC	NC	NA	NC	NC	NA	NC	NC
Public Water Supply												
Finished Water: Chloride	X	X	X	X	X	X	X	X	NC	NC	NC	X
Finished Water: Sulfate	X	X	X	X	X	X	X	X	NC	NC	NC	X
Finished Water: TDS	X	X	X	X	X	X	X	X	NC	NC	NC	X
Surface Water: Chloride	X	X	X	X	X	X	X	X	NC	**C**	NC	X
Surface Water: Sulfate	X	X	X	X	X	X	X	X	NC	NC	NC	X
Surface Water: TDS	X	X	X	X	X	X	X	X	NC	**C**	NA	X

Colorado River Basin Tabular Summary of Water Quality Concerns (continued)

Key to concern codes NC = no concern C = concern TH = threatened NA = not assessed X = not applicable	1434C Lake Bastrop
WATER QUALITY CONCERNS	
Sediment Contaminants	NA
Fish Tissue Contaminants	NA
Narrative	NC
Nutrient Enrichment	
Ammonia Nitrogen	NC
Nitrite + Nitrate Nitrogen	NC
Orthophosphorus	NC
Total Phosphorus	NC
Algal Growth	
Chlorophyll *a*	NC
Public Water Supply	
Finished Water: Chloride	X
Finished Water: Sulfate	X
Finished Water: TDS	X
Surface Water: Chloride	X
Surface Water: Sulfate	X
Surface Water: TDS	X

Appendix 5B

Lake Level Graphs and Tables

This Page Intentionally
Left Blank

Figure 5B-1
Lake Conroe Elevations

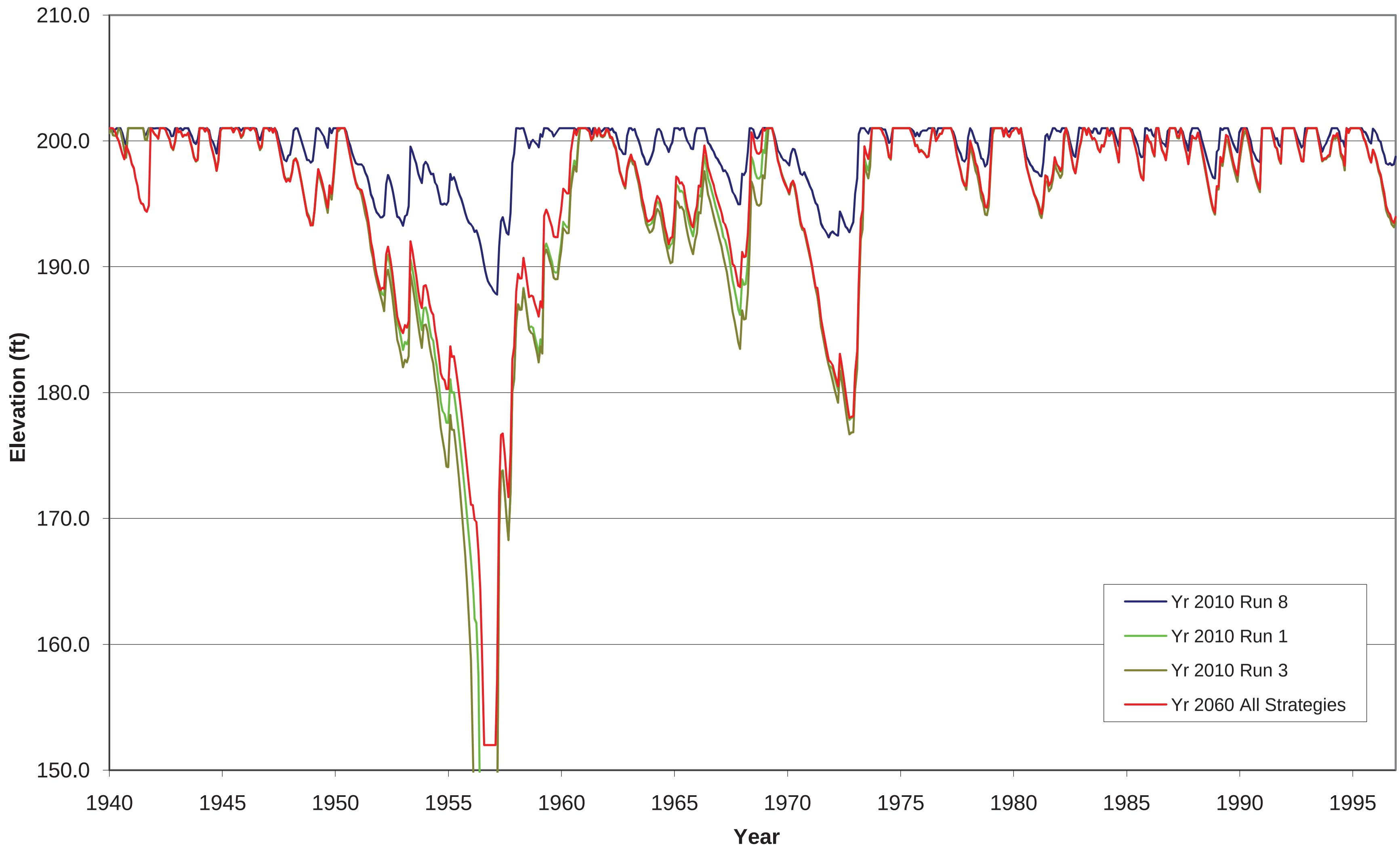


Figure 5B-2
Lake Conroe Elevation Percentiles

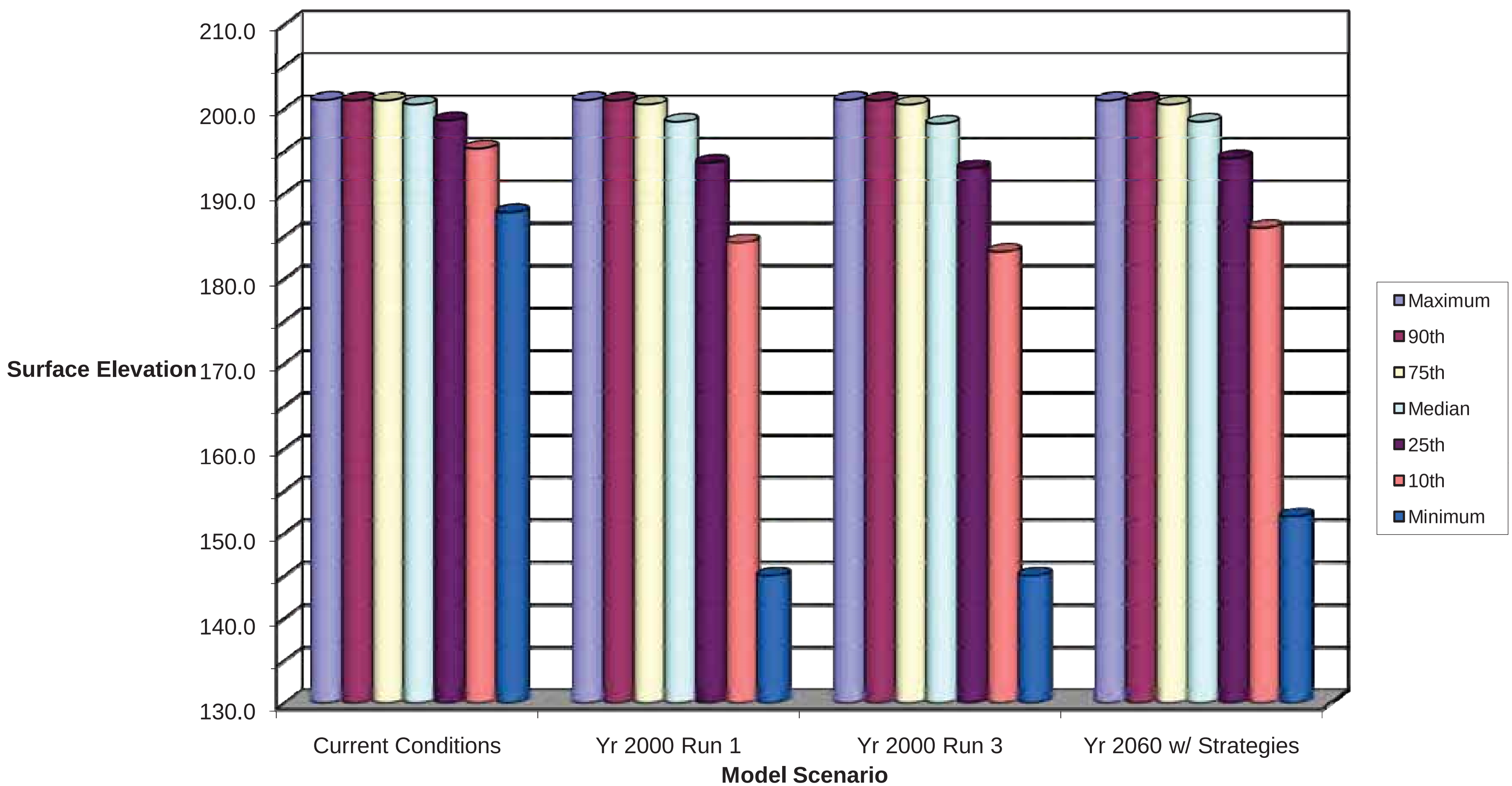


Figure 5B-3
Lake Houston Elevations

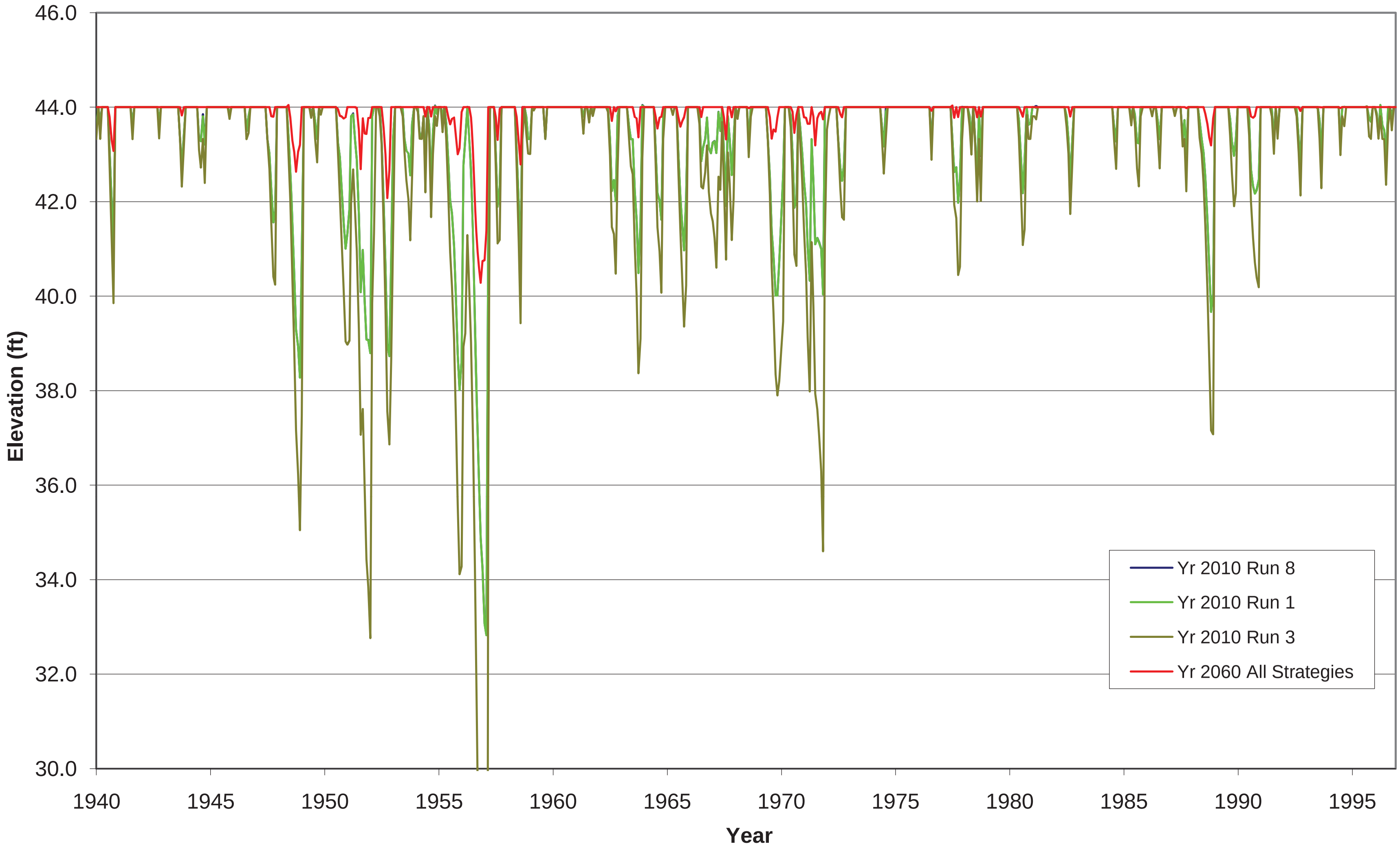


Figure 5B-4
Lake Houston Elevation Percentiles

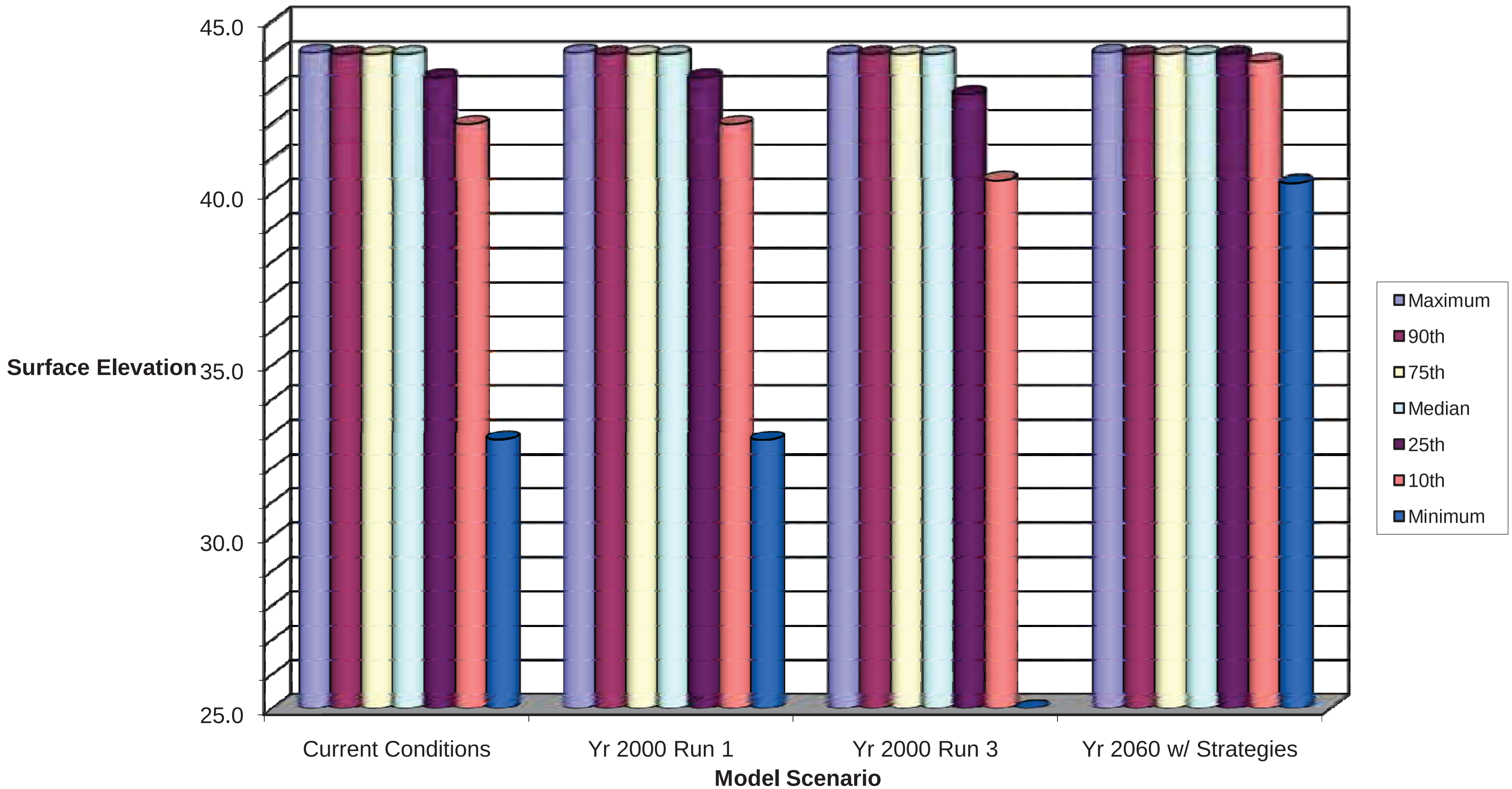


Figure 5B-5
Lake Livingston Elevations

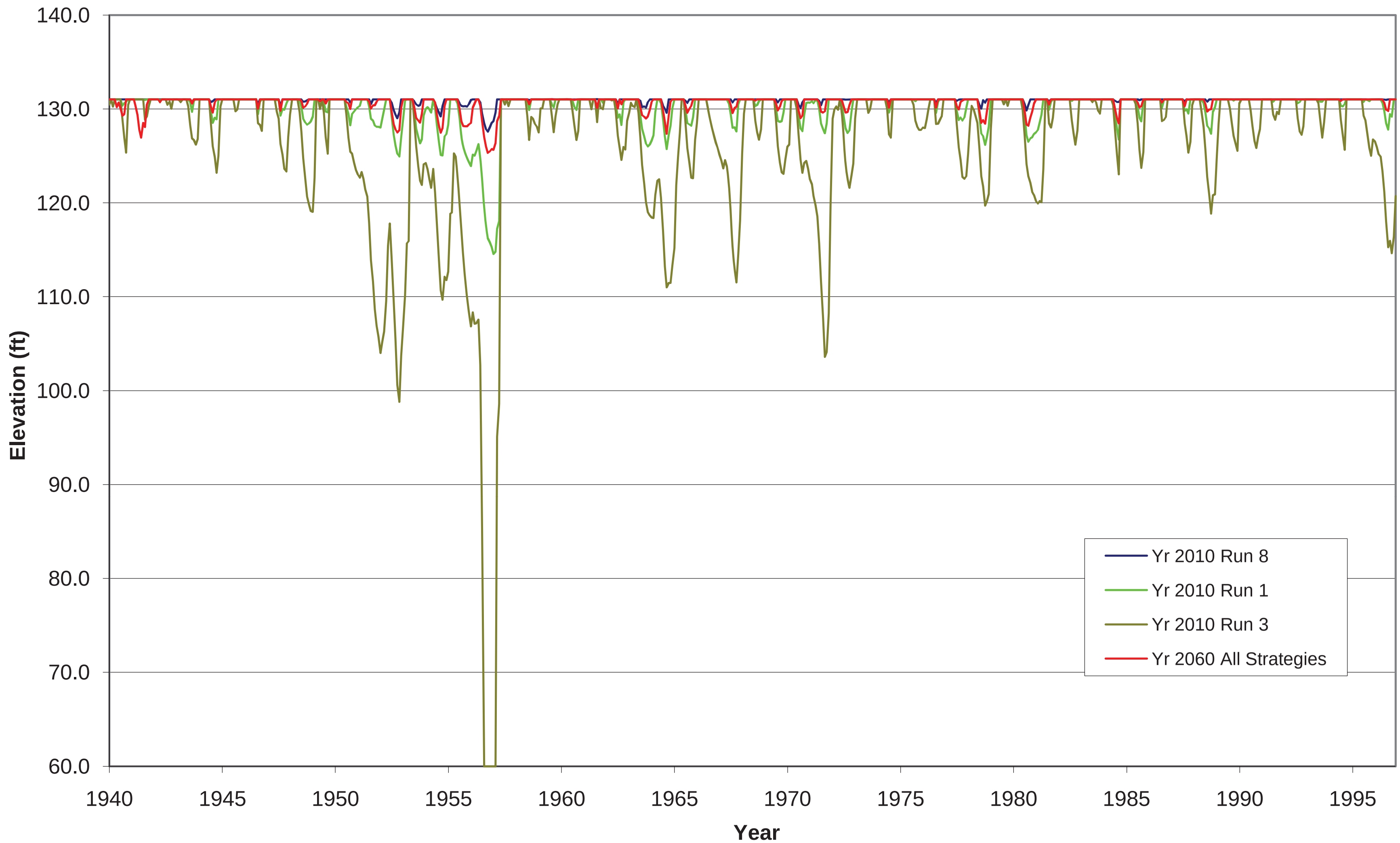
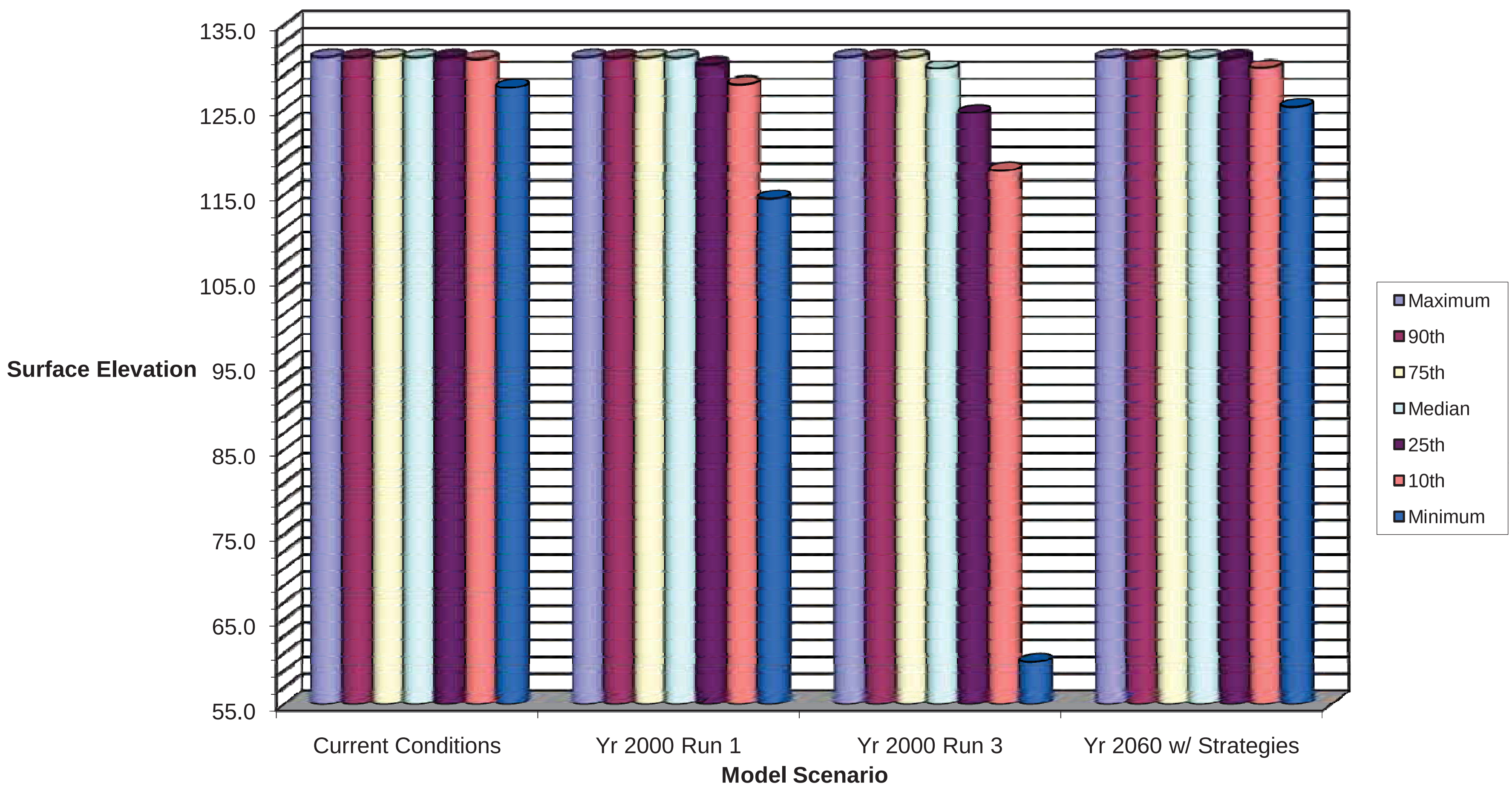


Figure 5B-6
Lake Livingston Elevation Percentiles



Contents

**This Page
Intentionally Left Blank**

Chapter 6 – Water Conservation and Drought Management Plans

This chapter presents the minimum necessary requirements for conservation plans and drought contingency plans and provides (at the end of the chapter) model conservation plans and drought contingency plans for the various water user categories. The model conservation plans and drought contingency plans were developed specifically for Region H in accordance with and as described in Texas Water Code 11.1271 and 11.1272. Model drought contingency plans, which are periodically updated, can be downloaded from the Texas Commission on Environmental Quality (TCEQ) website (www.tceq.state.tx.us/). The drought contingency models presented in this chapter were downloaded from the TCEQ in August, 2009.

6.1 Water Conservation Plan

Water conservation plans are required by the Texas Commission on Environmental Quality (TCEQ)/Texas Water Development Board (TWDB) for the following water users:

- Applicants who apply for TWDB loan requests
- Applicants for new or amended water rights
- Any holder of an existing permit, certified filing, or certificate of adjudication if requested by TCEQ/TWDB for appropriation of a water right greater than 1000 acre-feet per year for municipal, industrial, and other uses excluding irrigation. For irrigation uses, the threshold is 10,000 acre-feet per year.

Conservation plans developed for submittal with water right applications for appropriation of State water should discuss the evaluation of water conservation with respect to their application. This would include discussions of water conservation as an alternative to the potentially appropriated State water as well as the evaluation of any other conservation Best Management Practices (BMP) as an alternative to the new water right.

Minimum conservation and drought management plan requirements for specific water use categories are discussed in the following subsections.

6.1.1 Municipal Uses by Public Water Suppliers[1]

Water conservation plans for municipal water use by public water suppliers (i.e., documented Region H municipal Water User Groups) must include specific information as listed below. If the plans do not provide information for each requirement, the public water supplier shall include in the plans an explanation of why the requirement is not applicable.

- A utility profile including, but not limited to, information regarding population and customer data, water use data, water supply system data, and wastewater system data.
- Until May 1, 2005, specification of conservation goals including, but not limited to, municipal per capita water use goals, the basis for the development of such goals, and a time frame for achieving the specified goals and,

[1] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.2

- Beginning May 1, 2005, specific, quantified 5-year and 10-year targets for water savings to include goals for water loss programs and goals for municipal use in gallons per capita per day. The goals established by a public water supplier under this subparagraph are not enforceable.

- Metering device(s) within an accuracy of plus or minus 5.0 percent in order to measure and account for the amount of water diverted from the source of supply.

- A program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.

- Measures to determine and control unaccounted-for uses of water (for example: periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections, abandoned services, etc.).

- A program of continuing public education and information regarding water conservation.

- A water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water.

- A reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies.

- A means of implementation and enforcement which should be shown by either of the following:

    1. A copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier, or

    2. A description of the authority by which the water supplier will implement and enforce the conservation plan.

- Documentation of coordination with the Region H Regional Water Planning Group for the service area of the public water supplier to ensure consistency with the appropriate approved Region H Regional Water Plan.

Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next 10 years subsequent to the effective date of the plan must also include the following information:

- A program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system to control unaccounted-for uses of water.

- A record management system to record water pumped, water deliveries, water sales, and water losses that allows for the separation of water sales and uses into residential, commercial, public and institutional, and industrial users.

- A requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

If the conservation goals cannot be achieved through the minimum conservation plan requirements, the water supplier can implement water conservation strategies to help achieve their goals. The TCEQ can also require the water supplier to implement a conservation BMP strategy to achieve the goals set in the conservation plan. Some of the water conservation BMPs are listed below, and a more detailed list can be found in the *Water Conservation Best Management Practices Guide, Report 362. Texas Water Development Board, November 2004.*

- Conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates.
- Adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition.
- A program encouraging the replacement or retrofit of existing structures built prior to 1991 with water conserving plumbing fixtures.
- Reuse and/or recycling of wastewater and/or graywater.
- A program for pressure control and/or reduction in the distribution system and/or for customer connections.
- A program and/or ordinance(s) for landscape water management.
- A method for monitoring the effectiveness and efficiency of the water conservation plan.
- Any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

A water conservation plan prepared in accordance with *31 TAC §363.15* (relating to Required Water Conservation Plan) of the TWDB, and substantially meeting the requirements of this section and other applicable commission rules, may be submitted to meet application requirements in accordance with a memorandum of understanding between the TCEQ and the TWDB.

Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous 5-year and 10-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan no later than May 1, 2009, and every five years after that date to coincide with the Region H Water Planning Group's regional water plan update.

6.1.2 Industrial or Mining[2]

Water conservation plans for industrial or mining uses of water must provide the information as outlined below. If the plan does not provide information for each requirement, the industrial or mining water user shall include in the plan an explanation of why the requirement is not applicable.

[2] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.3

- A description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal.

- Until May 1, 2005, specification of conservation goals, the basis for the development of such goals, and a time frame for achieving the specified goals and,

- Beginning May 1, 2005, specific, quantified 5-year and 10-year targets for water savings and the basis for the development of such goals. The goals established by industrial or mining water users under this paragraph are not enforceable.

- A description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0 percent to be used in order to measure and account for the amount of water diverted from the source of supply.

- Leak-detection, repair, and accounting for water loss in the water distribution system.

- Application of state-of-the-art equipment and/or process modifications to improve water use efficiency.

- Any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

Beginning May 1, 2005, an industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous 5-year and 10-year targets and any other new or updated information. The industrial or mining water user shall review and update the next revision of its water conservation plan no later than May 1, 2009, and every 5 years after that date to coincide with the Region H Water Planning Group regional water plan update.

6.1.3 Agriculture[3]

A water conservation plan for agricultural use of water must provide information in response to the following subsections. If the plan does not provide information for each requirement, the agricultural water user must include in the plan an explanation of why the requirement is not applicable.

For an individual agricultural user other than for irrigation:

- A description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal.

- Until May 1, 2005, specification of conservation goals, the basis for the development of such goals, and a time frame for achieving the specified goals.

- Beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by agricultural water users under this subparagraph are not enforceable.

[3] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.4

- A description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0 percent to be used in order to measure and account for the amount of water diverted from the source of supply.

- Leak-detection, repair, and accounting for water loss in the water distribution system.

- Application of state-of-the-art equipment and/or process modifications to improve water use efficiency.

- Any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

For an individual agricultural irrigation user:

- A description of the irrigation production process which shall include, but is not limited to, the type of crops and acreage of each crop to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated.

- A description of the irrigation method or system and equipment including pumps, flow rates, plans, and/or sketches of the system layout.

- A description of the device(s) and/or methods within an accuracy of plus or minus 5.0 percent to be used in order to measure and account for the amount of water diverted from the source of supply.

- Until May 1, 2005, specification of conservation goals including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution abatement and prevention plan.

- Beginning May 1, 2005, specific, quantified 5-year and 10-year targets for water savings including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution abatement and prevention plan. The goals established by an individual irrigation water user under this subparagraph are not enforceable.

- Water-conserving irrigation equipment and application system or method including, but not limited to, surge irrigation, low pressure sprinkler, drip irrigation, and nonleaking pipe.

- Leak-detection, repair, and water-loss control.

- Scheduling the timing and/or measuring the amount of water applied (e.g., soil moisture monitoring).

- Land improvements for retaining or reducing runoff and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control.

- Tailwater recovery and reuse.

- Any other water conservation practice, method, or technique which the user shows to be appropriate for preventing waste and achieving conservation.

For a system providing agricultural water to more than one user:

- A system inventory for the supplier's:

  - Structural facilities including the supplier's water storage, conveyance, and delivery structures.

  - Management practices, including the supplier's operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries.

  - A user profile including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation systems, the types of drainage systems, and total acreage under irrigation, both historical and projected.

- Until May 1, 2005, specification of water conservation goals, including maximum allowable losses for the storage and distribution system.

- Beginning May 1, 2005, specific, quantified 5-year and 10-year targets for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable.

- A description of the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply.

- A monitoring and record management program of water deliveries, sales, and losses.

- A leak-detection, repair, and water loss control program.

- A program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures.

- A requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter.

- Official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy of the supplier.

- Any other water conservation practice, method, or technique which the supplier shows to be appropriate for achieving conservation.

- Documentation of coordination with the regional water planning groups in order to ensure consistency with appropriate approved regional water plans.

A water conservation plan prepared in accordance with the rules of the United States Department of Agriculture Natural Resource Conservation Service, the Texas State Soil and Water Conservation Board, or other Federal or State agencies and substantially meeting the requirements of this section and other applicable TCEQ rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the TCEQ and that agency.

Beginning May 1, 2005, an agricultural water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous 5-year and 10-year targets and any other new or updated information. An agricultural water user shall review and update the next revision of its water conservation plan no later than May 1, 2009, and every 5 years after that date to coincide with the Region H Water Planning Group regional water plan update.

6.1.4 Wholesale Water Providers[4]

A water conservation plan for a wholesale water supplier must provide information in response to each of the following paragraphs. If the plan does not provide information for each requirement, the wholesale water supplier shall include in the plan an explanation of why the requirement is not applicable.

- A description of the wholesaler's service area, including population and customer data, water use data, water supply system data, and wastewater data.

- Until May 1, 2005, specification of conservation goals including, where appropriate, target per capita water use goals for the wholesaler's service area, maximum acceptable unaccounted-for water, the basis for the development of these goals, and a time frame for achieving these goals and,

- Beginning May 1, 2005, specific, quantified 5-year and 10-year targets for water savings including, where appropriate, target goals for municipal use in gallons per capita per day for the wholesaler's service area, maximum acceptable unaccounted-for water, and the basis for the development of these goals. The goals established by wholesale water suppliers under this subparagraph are not enforceable.

- A description as to which practice(s) and/or device(s) will be utilized to measure and account for the amount of water diverted from the source(s) of supply.

- A monitoring and record management program for determining water deliveries, sales, and losses.

- A program of metering and leak detection and repair for the wholesaler's water storage, delivery, and distribution system.

- A requirement in every water supply contract entered into or renewed after official adoption of the water conservation plan, and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements of this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter.

- A reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin. The reservoir systems operations plans shall include optimization of water supplies as one of the significant goals of the plan.

- A means for implementation and enforcement, which shall be evidenced by a copy of the ordinance, rule, resolution, or tariff, indicating official adoption of the water conservation plan

[4] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.5

by the water supplier; and a description of the authority by which the water supplier will implement and enforce the conservation plan.

- Documentation of coordination with the regional water planning groups for the service area of the wholesale water supplier in order to ensure consistency with the Region H Regional Water Plan.

6.1.5 Additional Conservation Strategies

Any combination of the following strategies shall be selected by the water wholesaler, in addition to the minimum requirements of paragraph (1) of this section, if they are necessary in order to achieve the stated water conservation goals of the plan. The TCEQ may require by executive order that any of the following strategies be implemented by the water supplier if the TCEQ determines that the strategies are necessary in order for the conservation plan to be achieved:

- Conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates.

- A program to assist agricultural customers in the development of conservation pollution prevention and abatement plans.

- A program for reuse and/or recycling of wastewater and/or graywater.

- Any other water conservation practice, method, or technique which the wholesaler shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

Beginning May 1, 2005, the wholesale water supplier shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. A wholesale water supplier shall review and update the next revision of its water conservation plan no later than May 1, 2009, and every five years after that date to coincide with the Region H Water Planning Group regional water plan update.

6.1.6 Other Water Uses[5]

A water conservation plan for any other purpose or use not covered in this subchapter shall provide information where applicable about those practices, techniques, and technologies that will be used to reduce the consumption of water, prevent or reduce the loss or waste of water, maintain or improve the efficiency in the use of water, increase the recycling and reuse of water, or prevent the pollution of water.

6.1.7 Water Conservation Evaluation

A special study was included in the 2011 Water Plan update to analyze the impact water conservation strategies have had on observed water demands. To accomplish this goal, surveys were produced and distributed to approximately 254 water users and wholesale water providers within Region H. The surveys focused identifying the water conservation measures that have been implemented, the measures that are considered for future implementation, and measureable impacts of implemented measures. The results of the study were used to revise the conservation strategies to reflect the information collected from the survey responses.

[5] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.6

6.1.7.1 Water Conservation Survey

Survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H. The survey asked each utility to provide information regarding recent per capita water use, current and future conservation strategies, efficacy of current strategies and the cost associated with each strategy. A copy of the Letter and Survey is provided in *Appendix 6A*. The results of the survey are included as *Appendix 6B*.

6.1.7.2 Survey Results

The results of the survey were compiled to evaluate which conservation measures were currently being performed and which measures will most likely be evaluated by the WUGs for future use.

The evaluation of the returned surveys yielded the most-likely conservation BMPs to be considered for conservation management strategy. The WUGs were classified into four groups consisting of:

- Specific Water Conservation Strategies
- (Type 1) Population of 3,300 persons or fewer
- (Type 2) Population greater than 3,300 persons but 10,000 or fewer persons
- (Type 3) Population greater than 10,000 persons

Approximately 35 surveys were returned out of the 254 conservation letters mailed. 34 surveys were returned by utilities detailing conservation practices for municipal, industrial and commercial customers. 1 survey was returned detailing agricultural conservation methods. The results described in the following paragraphs will focus on the utilities that have implemented water conservation measures for municipal, industrial, and commercial use. The utilities serving populations of 3,300 or fewer persons consisted of approximately 17 percent of the survey responses. Utilities serving populations greater than 3,300 persons but 10,000 or fewer persons consisted of approximately 43 percent of the survey responses. The remaining 40 percent was from wholesale water providers or utilities serving populations greater than 10,000 persons.

6.1.7.3 Additional Water Conservation Plans

Water conservation plans submitted to the Region H WPG prior to August 2008 were used to develop additional WUG specific water conservation plans. To accurately reflect water conservation strategies obtained from individual WUGs, specific water conservation strategies were developed to reflect the individual WUG goals. Specific Water Conservation Strategies were developed for the WUGs described below. Additional water conservation plans obtained from the TWDB and TCEQ were used to identify additional water conservation practices utilized by public water suppliers in Region H.

6.1.7.4 Level of Impact

The 2006 Region H Water Plan identified water conservation as a strategy to address shortages for approximately 205 municipal MUGs. Based on the Survey Results and additional Water Conservation Plans received by the RWPG approximately 86% (6 out of 7 responses) of the WUGs that were assigned a water conservation strategy in 2010 have implemented a water conservation plan.

6.1.7.5 Conclusions

Results obtained from the Conservation Survey responses were sufficient enough to determine the types of water conservation measures that were anticipated by water utilities of different sizes.

- Specific conservation strategies could be created for WUGs that provided water conservation plans in response to the survey or to the Region H WPG.

- The level of water conservation considered by entities that responded to the survey supports the WUG classification levels developed in the 2006 Region H Plan.

- Many small municipal water utilities that serve populations smaller than 500 have implemented basic conservation plans that typically include public information mail outs and water conservation price structures to deter excessive use. These utilities are generally collectively represented in the plan by "County-Other" WUGs. Many "County-Other" WUGs with shortages in the 2006 Plan were assigned more aggressive conservation strategies based on their population. This is inconsistent with the fact that the utilities represented in these WUGs have smaller populations.

- Regional Water Authorities such as the Central Harris County Regional Water Authority (CHCRWA), North Fort Bend Water Authority (NFBWA), North Harris County Regional Water Authority (NHCRWA) and the West Harris County Regional Water Authority (WHCRWA) supply water to a collection of municipal utility districts with various populations. The 2006 Plan recommended aggressive conservation strategies for the NHCRWA and the WHCRWA based on their collective populations. This is inconsistent with the fact that many conservation strategies will have to be implemented by the individual municipal utility districts. Member cities associated with Regional Water Authorities such as Jersey Village (NHCRWA) and Katy (WHCRWA) will be able to implement more aggressive conservation measures.

- Little information was provided to recommend revising the costs associated with various water conservation measures. However, the costs that were provided could be utilized to develop WMS costs for specific WUG conservation strategies.

6.1.7.6 Application of Water Conservation Strategies

Water conservation was applied prior to expanding groundwater use and water supply contracts for those WUGs with existing contracts with wholesale water providers. Generally, this strategy was only applied to those WUGs with shortages as identified in *Chapter 4*. The WUGs were classified into four groups for purposes of applying this strategy. The first group of WUG conservation strategies was assigned to WUGs with specific conservation strategies. Three additional generic strategies were developed to classify WUGs by population size and assign conservation savings accordingly.

Specific Water Conservation Strategies

Specific water conservation strategies were tailored to WUG water conservation plans that had been submitted to the Regional Water Planning Group. Approximately 10 WUG specific conservation strategies were developed for the 2011 Region H Water Plan. Water conservation savings were assigned in every decade to municipalities with WUG specific strategies whether or not the WUG was experiencing a shortage. Water utilities that were included in County-Other WUGs or did not submit a water conservation plan to the RWPG were assigned a generic water conservation plan based on WUG population.

Generic Water Conservation Strategies

Three WUG size classifications were developed to recognize and account for the various degrees by which WUGs of different sizes will likely implement advanced conservation measures. The three WUG classifications are described in *Section 6.1.7.2*. Larger WUGs with greater resources are more likely to be able to implement a comprehensive conservation program than a smaller WUG with lesser resources. Therefore, the expected water savings and costs for the region are also likely to differ depending on the relative size of the WUG.

6.2 Drought Contingency Plan[6]

Drought contingency plans can be required by the TCEQ/TWDB for certain applicants and water rights holders.

- The TCEQ shall by rule require wholesale and retail public water suppliers and irrigation districts to develop drought contingency plans consistent with the appropriate approved regional water plan to be implemented during periods of water shortages and drought.

- The wholesale and retail public water suppliers and irrigation districts shall provide an opportunity for public input during preparation of their drought contingency plans and before submission of the plans to the commission.

Beginning in May 2005, the following are additional requirements in the drought contingency plan:

- Specific, quantified targets for water use reductions to be achieved during periods of water shortages and drought. The entity preparing the plan shall establish the targets.

- The TCEQ and the TWDB by joint rule shall identify quantified target goals for drought contingency plans that wholesale and retail public water suppliers, irrigation districts, and other entities may use as guidelines in preparing drought contingency plans. Goals established under this subsection are not enforceable requirements.

The TCEQ and the TWDB shall jointly develop model drought contingency programs for different types of water suppliers that suggest best management practices for accomplishing the highest practicable levels of water use reductions achievable during periods of water shortages and drought for each specific type of water supplier.

6.2.1 Municipal Uses by Public Water Suppliers[7]

Drought contingency plans for retail public water suppliers, where applicable, and for public water suppliers, must include the following minimum elements.

- Preparation of the plan shall include provisions to actively inform the public and affirmatively provide opportunity for public input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

- Provisions shall be made for a program of continuing public education and information regarding the drought contingency plan.

- The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans.

[6] Model drought contingency plans specifically for Region H were developed for each water use category and are located at the end of this Chapter.
[7] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.20

- The drought contingency plan must include a description of the information to be monitored by the water supplier and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

- The drought contingency plan must include drought or emergency response stages providing for the implementation of measures in response to at least the following situations:

    - Reduction in available water supply up to a repeat of the drought of record.

    - Water production or distribution system limitations.

    - Supply source contamination.

    - System outage due to the failure or damage of major water system components (e.g., pumps).

- The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

- The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

    - Curtailment of nonessential water uses.

    - Utilization of alternative water sources and/or alternative delivery mechanisms with the prior approval of the TCEQ executive director as appropriate (e.g., interconnection with another water system, temporary use of a nonmunicipal water supply, use of reclaimed water for nonpotable purposes, etc.).

- The drought contingency plan must include the procedures to be followed for the initiation or termination of each drought response stage, including procedures for notification of the public.

- The drought contingency plan must include procedures for granting variances to the plan.

- The drought contingency plan must include procedures for the enforcement of mandatory water use restrictions, including specification of penalties (e.g., fines, water rate surcharges, discontinuation of service) for violations of such restrictions.

Privately owned water utilities shall prepare a drought contingency plan in accordance with this section and incorporate such plan into their tariff.

Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply. A wholesale or retail water supplier shall notify the executive director within 5 business days of the implementation of any mandatory provisions of the drought contingency plan.

The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every 5 years, based on new or updated information, such as the adoption or revision of the Region H Regional Water Plan.

6.2.2 Irrigation Uses[8]

A drought contingency plan for an irrigation use, where applicable, must include the following minimum elements. Drought contingency plans for irrigation water suppliers must include policies and procedures for the equitable and efficient allocation of water on a pro rata basis during times of shortage in accordance with *Texas Water Code, §11.039*.

- Preparation of the plan shall include provisions to actively inform and to affirmatively provide opportunity for users of water from the irrigation system to provide input into the preparation of the plan and to remain informed of the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the water users and providing written notice to the water users concerning the proposed plan and meeting.

- The drought contingency plan must document coordination with the regional water planning groups to ensure consistency with the appropriate approved regional water plans.

- The drought contingency plan must include water supply criteria and other considerations for determining when to initiate or terminate water allocation procedures, accompanied by an explanation of the rationale or basis for such triggering criteria.

- The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

- The drought contingency plan must include methods for determining the allocation of irrigation supplies to individual users.

- The drought contingency plan must include a description of the information to be monitored by the water supplier and the procedures to be followed for the initiation or termination of water allocation policies.

- The drought contingency plan must include procedures for use accounting during the implementation of water allocation policies.

- The drought contingency plan must include policies and procedures, if any, for the transfer of water allocations among individual users within the water supply system or to users outside the water supply system.

- The drought contingency plan must include procedures for the enforcement of water allocation policies, including specification of penalties for violations of such policies and for wasteful or excessive use of water.

- Wholesale water customers. Any irrigation water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier, and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply.

[8] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.21

- Protection of public water supplies. Any irrigation water supplier that also provides or delivers water to a public water supplier(s) shall consult with that public water supplier(s) and shall include in the plan, mutually agreeable and appropriate provisions to ensure an uninterrupted supply of water necessary for essential uses relating to public health and safety. Nothing in this provision shall be construed as requiring the irrigation water supplier to transfer irrigation water supplies to non-irrigation use on a compulsory basis or without just compensation.

Irrigation water users shall review and update, as appropriate, the drought contingency plan at least every five years, based on new or updated information such as adoption or revision of the Region H Regional Water Plan.

6.2.3 Wholesale Water Providers[9]

A drought contingency plan for a wholesale water provider should include at a minimum the following information:

- Preparation of the plan shall include provisions to actively inform the public, to affirmatively provide opportunity for user input in the preparation of the plan, and for informing wholesale customers about the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

- The drought contingency plan must document coordination with the Region H Regional Water Planning Group for the service area of the wholesale water provider to ensure consistency with the Region H Regional Water Plan.

- The drought contingency plan must include a description of the information to be monitored by the water supplier and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

- The drought contingency plan must include a minimum of three drought or emergency response stages providing for the implementation of measures in response to water supply conditions during a repeat of the drought-of-record.

- The drought contingency plan must include the procedures to be followed for the initiation or termination of drought response stages, including procedures for notification of wholesale customers regarding the initiation or termination of drought response stages.

- The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this paragraph are not enforceable.

- The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

    - Pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in *Texas Water Code, §11.039*; and

[9] Information in this subsection was obtained from the Texas Administrative Code Title 30 Part 1 Chapter 288 Subchapter A Rule 288.22

  - Utilization of alternative water sources with the prior approval of the TCEQ executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

- The drought contingency plan must include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with *Texas Water Code, §11.039*.

- The drought contingency plan must include procedures for granting variances to the plan.

- The drought contingency plan must include procedures for the enforcement of any mandatory water use restrictions, including specification of penalties (e.g., liquidated damages, water rate surcharges and discontinuation of service) for violations of such restrictions.

The wholesale water provider shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan. The wholesale water provider shall review and update, as appropriate, the drought contingency plan at least every five years, based on new or updated information such as adoption or revision of the Region H Regional Water Plan.

6.2.4 Region H Drought Management Study

The Region H Water Planning Group (RHWPG) requested and received funding from the Texas Water Development Board (TWDB) to conduct three studies in advance of the 2011 update of the Region H Water Plan. One study focused on evaluating the efficacy and impact of drought contingency (a.k.a. drought response) measures as a potential water management strategy in Region H. The key question addressed by this study was:

Can implementation of drought contingency measures within Region H during critical drought periods be used in lieu of other water management strategies to meet projected water demands?

The scope of work for the Region H Drought Management Study was divided into two primary tasks. The first task focused on evaluating the efficacy or effectiveness of drought contingency plans adopted and implemented by municipal water suppliers within Region H, elsewhere in Texas, and nationally. The second task consisted of a quantitative evaluation of the potential impact of drought response measures on major water supply reservoirs in Region H, namely Lake Conroe, Lake Houston, Lake Livingston and the proposed Allens Creek Reservoir. Specifically, Texas Commission on Environmental Quality (TCEQ) water availability models were used to analyze reservoir conditions (i.e., levels and storage volumes) during critical drought periods both with and without implementation of drought response measures.

The study found that most drought contingency plans place a heavy emphasis on “demand management measures” that are designed to reduce water demands by means of curtailment of certain uses. It’s important to note that demand management in this context is distinctly different from water conservation, although the terms are often used interchangeably. The objective of water conservation is to achieve lasting, long-term reductions in water use through improved water use efficiency, reduced waste, and through reuse and recycling. By contrast, demand curtailment is focused on temporary reductions in water use in response to temporary and potentially recurring water supply shortages or other water supply emergencies (e.g., equipment failures caused by excessively high peak water demands). Common approaches to water demand curtailment, applied individually or in combination, include:

- Prescriptive restrictions or bans on non-essential water uses and waste. In a municipal setting, such restrictions commonly target landscape irrigation, car washing, ornamental fountains, etc.

- Use of water pricing strategies, such as excess use surcharges, to encourage compliance with water use restrictions or to penalize excessive water use.

- Water rationing, where water is allocated to users on some proportionate or pro rata basis.

A significant number of public water systems in Region were found on the TCEQ drought impact list and implemented drought measures during the years 1998 (62 systems), 2000 (35 systems) and 2005 (39 systems). The counties that recorded the most public water systems on the list are Harris and Montgomery counties. Together, Harris and Montgomery Counties accounted for approximately 55 percent of the systems on the drought impact list. Approximately 90 percent of the water systems on the drought impact list serve populations less than or equal to 10,000 people and have 5,000 connections or fewer. TCEQ records also indicate that the list is comprised mostly of public water systems that are supplied by groundwater.

Surveys of Major Public Water Systems indicated that none of the Region H public water systems that were on the TCEQ drought impact list over the period from 1996 to 2008 experienced actual water shortage conditions. Rather, it appears that these water systems were placed on the list because of high seasonal peak water demands and attendant problems or concerns with water production infrastructure. The majority of Region H public water systems on the TCEQ drought impact list are municipal utility districts (MUDs), water supply corporations (WSCs), subdivisions and rural municipalities that rely on groundwater from local wells. Sustained high peak water demands during the summer months often create a strain on groundwater supplies, not so much in terms of the availability of supply but rather in terms of groundwater production capacity, indicating a need perhaps for additional wells to increase delivery capacity or deeper wells to compensate for greater than normal draw down. Public water systems that rely on surface water often experience similar problems in terms of limited capacity to treat raw water and/or distribution system capacity limitations.

The study found that there is little empirical research to quantity the effectiveness of drought response measures. Most water suppliers that have implemented DCPs have not thoroughly evaluated the effects. “Post-event” analyses was found to typically only report “gross” changes in water demand, most commonly expressed as a percentage reduction. It was also found that most DCPs in Texas are focused on seasonal peaking problems rather than actual water shortage and are always addressed at peak shaving.

The Drought Management Study concluded that, while drought contingency planning is a critical component of water supply management and may provide short-term benefits during severe drought conditions; drought management alone will not replace any recommended long-term water management strategies. This conclusion was based on the following:

1. According to the current Region H Plan, there are no unmet water supply needs associated with existing reservoirs.
2. The current Region H Plan, therefore, does not include water management strategies that could be replaced by demand curtailment during drought. However the magnitude and timing of the TRA to SJRA inter-basin transfer strategy would be affected by the conjunctive use of existing supplies in Montgomery County. Conjunctive use of existing supplies would be recommended prior to inter-basin transfers.
3. Implementation of DCPs would not “free up” water supply for use by others because the demand reduction would only occur during critical drought – demand curtailment is not the same as water conservation.

4. During “normal” conditions, water supply would be needed to meet full unconstrained demand.
5. Current TWDB policy for regional water supply planning requires that all identified water supply needs, based on drought-of-record conditions, be satisfied except in cases where there are no feasible strategies.
6. Drought contingency measures were shown to be effective in “stretching” water supplies during drought conditions. However, this “stretching” of supplies during drought were measured in terms of months and therefore, while this may be critical for an individual supply in crisis, is insignificant in the context of long-term water planning. Long term water planning assumes that only the firm yield from reservoirs is available for allocation. Water saved by implementing drought contingency measures would only be available on an interruptible basis during drought conditions. As a result, the saved water could only be allocated to meet demands that are present on an interruptible basis; that is, the increase in demands above normal hydrologic conditions in response to drought conditions. Under this scenario, implementation of drought contingency measures could be used to reduce dry year demands down to average year demand levels. Traditional supply sources and long-term water management strategies would still be required to supply average year demands.
7. Drought contingency planning and the various measures implemented to curtail demand during severe drought conditions are very critical components of any water supply management plan. These plans should be evaluated often and the actions enforced when needed to curtail demand and potentially extend water supplies during drought conditions. However, these measures alone will not replace the need to implement recommended long-term water management strategies.

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template

Municipal Uses

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template – Municipal Uses
Introduction and Background

Brief introduction describing WUG, its provided services, and general information.

1. Purpose

Purpose is to identify and establish principles, practices, and standards to effectively conserve and efficiently use available water supplies and water distribution system capacity. Possibly provide historical annual average residential water demands and the goals for reductions in municipal demand included in the plan.

2. Location

General location of WUG and its service area

3. Customer Data

Population and Service Area Data

- Provide CCN certificate (if applicable) from TCEQ and service area map.
- Provide service area size in square miles.
- Provide current population of service area.
- Provide current population served by utility (water, wastewater, etc.).
- Provide population served by utility for previous five years.
- Provide projected population for service area for 2010, 2020, 2030, 2040, 2050.
- Provide source/method of calculating current and projected populations.

Active Connections

- Provide current number of active connections by user type and whether they are metered or not-metered (Metered Residential, Not-metered Residential, Metered Commercial, Not-metered Commercial, Metered Industrial, Not-metered Industrial, Metered Public, Not-metered Public, Metered Other, Not-metered Other).
- Provide net number of new connections/year for most recent three years by user type.

High Volume Customers

- Provide annual water use for five highest volume retail and wholesale customers indicating if treated or raw water delivery.

4. Water Use Data

Water Accounting Data

- Provide amount of water use monthly for previous five years in 1,000 gallons and indicate whether the water is raw water diverted or treated water distributed.
- Provide source/method of obtaining monthly water use for previous five years.

- Provide amount of water in 1,000 gallons delivered as recorded by user type (residential, commercial, industrial, wholesale, other).
- Provide previous five year records for unaccounted for water use.
- Provide previous five year records for annual peak-to-average daily use ratio.
- Provide municipal per capita water use for previous five years.
- Provide seasonal water use for previous five years (gpd).

Projected Water Demands

- Provide total water demand estimates for utility's planning horizon indicating data sources/methods for determining water demand.
- Discuss conservation measures already implemented, if any, including impacts of measures and methods of determination of impacts.

5. Water Supply System

Water Supply Sources

- Provide current water supply sources and amounts available for surface water, groundwater, contracts, and other.

Treatment and Distribution System

- Provide design daily system capacity.
- Provide storage capacity (elevated and ground).
- Provide description of water system including number of treatment plants, wells, storage tanks along with sketch of system.
- Provide estimates of time before additional facilities for supply, storage, and pumping will be needed without conservation measures.

6. Wastewater Utility System

Wastewater System Data

- Provide design capacity of wastewater treatment plant.
- Provide description of wastewater system in service area including TCEQ name, number of treatment plants, operator, owner, receiving stream of discharge if applicable.
- Provide sketch of plant and discharge point locations

Wastewater Data for Service Area

- Provide percent of water service area served by wastewater system.
- Provide monthly volume treated for previous three years.
- Provide quality information on treatment plant effluent for reuse applications.
- Determine ratio between treated water pumped and wastewater flow.

7. Utility Operating Data

Water and wastewater rates/ rate structure for all classes – provide list of rates

(Rates should be cost-based so that they do not promote the excessive use of water)

Other relevant data

8. Water Conservation Goals

Goals for municipal utilities established to maintain/reduce consumption measured in:

- Gallons per capita per day used
- Unaccounted for water uses
- Peak day to average day ratio
- Increase in reuse or recycling of water

TCEQ/TWDB will assess conservation goals based on whether the following is addressed:

- Identification of a water/wastewater problem
- Completion of utility profile
- Selection of goals based on technical potential to save water as in utility profile
- Performance of cost-benefit analysis of strategies

Complete following (in gpcd) to quantify conservation goals for utility's service area:

Estimation for reducing per capita water use:

- Reduction in unaccounted-for uses
- Reduction in indoor water use due to water-conserving plumbing fixtures
- Reduction in seasonal use
- Reduction in water use due to public education program

Planning goal (Specific quantified five and ten year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita day)

A schedule for implementing the plan to achieve the applicant's targets and goals

Needed reduction in per capita to meet planning goal

9. Water Conservation Plan Elements – Other Programs/BMPs That Should be Part of the Conservation Plan

Supplier:

A method for tracking the implementation and effectiveness of the plan

Metering Program

- A master meter(s) to measure and account for the amount of water diverted from the source of supply

- A program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement)

Measures to Determine and Control Unaccounted for Water

- Measures to determine and control unaccounted-for uses of water (e.g., periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections, abandoned services, etc.)

Leak Detection and Repair (a program for leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water)

Reservoir System Operating Plan

Customer:

Education Programs

- Media Campaign School Programs
- Public Exhibitions

Water Rate Structure

Examples of programs/BMPs that could be considered in achieving the conservation goals:

Supplier:

- Plumbing and Landscape Ordinances
- Toilet Replacement/Rebates
- Clothes Washer Replacement/Rebates
- Hot-on-demand Rebate – circulating pumps installed to reduce water waste while waiting for the water to get warm
- Refrigerated Air Conditioning Cash Rebate
- Rain Barrel Rebate
- Rainwater Harvesting Program
- Efficient Irrigation Rebate

Customer:

- Reuse and Recycling of Wastewater and Graywater

10. Regional Water Planning and Coordination

11. Authority and Adoption

- Means of implementation and enforcement

Model Water Conservation Plan Template

Industrial and Mining Uses

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template – Industrial and Mining Uses
Introduction and Background

Brief introduction describing WUG, its provided services, and general information.

1. Purpose

Purpose is to identify and establish principles, practices, and standards to effectively conserve and efficiently use available water supplies and water distribution system capacity.

Possibly provide historical annual average Industrial or Mining water demands and the goals for industrial or mining water demand reduction included in the plan. (The water conservation plan 5- and 10-year targets should be discussed in *Section 1.4 – Water Conservation Plan Goals*).

2. Location

General location of WUG and its service area

3. Water Use Data

Water Accounting Data

- Description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal.

Projected Water Demands

- Provide total water demand estimates for utility's planning horizon indicating data sources/methods for determining water demand.

- Discuss conservation measures already implemented, if any, including impacts of measures and methods of determination of impacts.

4. Water Conservation Goals

Planning goal (Specific quantified five and ten year targets for water savings to include goals for water loss programs and goals for industrial and mining uses).

A schedule for implementing the plan to achieve the applicant's targets and goals.

Needed reduction in gallons per day (gpd) to meet planning goal.

5. Water Conservation Plan Elements –Other Programs/BMPs that should be part of the conservation plan

A method for tracking the implementation and effectiveness of the plan

Metering Program

- A master meter(s) (accurate to within plus or minus 5 percent) to measure and account for the amount of water diverted from the supply source

Measures to Determine and Control Unaccounted for Water

- Measures to determine and control unaccounted-for uses of water (e.g., periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections, abandoned services, etc.)

Leak Detection and Repair (a program for leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water)

List any application of state-of-the-art equipment and/or process modifications to improve water use efficiency

Examples of programs/BMPs that could be considered in achieving the conservation goals:

- Industrial Water Audit
- Industrial Water Waste Reduction
- Industrial Submetering
- Cooling Towers
- Cooling Systems (other than cooling towers)
- Industrial Alternative Sources and Reuse of Process Water
- Rinsing/Cleaning
- Water Treatment
- Boiler and Steam Systems
- Refrigeration (including chilled water)
- Once through Cooling
- Management and Employee Programs
- Industrial Landscape
- Industrial Site Specific Conservation

6. Regional Water Planning and Coordination

Beginning May 1, 2005, an industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the plan with the next revision of this water conservation plan coinciding with the Lavaca regional water planning process

Model Water Conservation Plan Template

Agricultural Uses

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template – Agricultural Uses
Introduction and Background

Brief introduction describing WUG, its provided services, and general information

1. Purpose

Purpose is to identify and establish principles, practices, and standards to effectively conserve and efficiently use available water supplies and water distribution system capacity.

Possibly provide historical annual average agricultural water demands and the goals for reduction in agricultural water demand included in the plan.

2. Location and General Information

General location of WUG and its service area

System Providing Agricultural Water to More Than One User

- System Inventory for the Suppliers facilities including water storage, conveyance, and delivery structures. Also discuss the operating practices and rules as well as water pricing policy. Accounting practices for the water should be briefly discussed.

- User profile including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation systems, the types of drainage systems, and total acreage under irrigation, both historical and projected.

3. Water Use Data

Water Accounting Data

Agricultural Use Other than Irrigation

- Description of the use of the water in the production process, including how the water diverted and transported from the source(s) of supply, how the water is utilized in the production process, and estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal.

Individual Irrigation User

- Description of the irrigation production process, including type of crops to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated.

- A description of the irrigation method or delivery system and equipment including pumps, flow rates, plans, and/or schematics of the system layout.

All Agricultural Users

Projected Water Demands

- Provide total water demand estimates for utility's planning horizon indicating data sources/methods for determining water demand

- Discuss conservation measures already implemented, if any, including impacts of measures and methods for determination of impacts.

4. Water Conservation Goals

All Agricultural Users

- Planning goal (Specific, quantified five-year and ten-year targets for water savings including, where appropriate, quantitative goals for irrigation/agricultural water use efficiency and a pollution abatement and prevention plan. The targets established by a water user under this section are not enforceable.

5. Water Conservation Plan Elements –Other Programs/BMPs That Should be Part of the Conservation Plan

All Agricultural Users

- A method for tracking the implementation and effectiveness of the plan
- Metering Program
    - A master meter(s) or other **device/method** (accurate to within +/- 5 percent) to measure and account for the amount of water diverted from the source of supply.
- Measures to Determine and Control Unaccounted for Water
    - Measures to determine and control unaccounted-for uses of water (e.g., periodic visual inspections along distribution lines and canals; annual or monthly audit of the water system to determine illegal connections, abandoned services, etc.)
- Leak Detection and Repair (a program for leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water)

Agricultural Use Other than Irrigation

- List any application of state-of-the-art equipment and/or process modifications to improve water use efficiency
- Any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

Individual Irrigation User

- Water-conserving irrigation equipment and application system or method including surge irrigation, low-pressure sprinkler, lining of on-farm irrigation ditches, and non-leaking pipe are a few examples of equipment to aid in conservation. List all conservation measures utilized to conserve water.
- Scheduling the timing and/or measuring the amount of water applied (e.g., soil moisture monitoring, etc.)

- Land improvements for retaining or reducing runoff, and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control

- Tailwater recovery and reuse

- Any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

System Providing Agricultural Water to More Than One User

- Monitoring and record management program of water deliveries, sales, and loses.

- A program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures.

- Any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan. Lining of district irrigation canals and replacement of canals with pipelines are a few examples of measures to aid in conservation.

- The customers of the agricultural water provider should also develop a water conservation plan or implement water conservation measures.

6. Regional Water Planning and Coordination

System Providing Agricultural Water to more than one User

- Beginning May 1, 2005, an agricultural water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the plan with the next revision of this water conservation plan coinciding with the regional water planning process.

7. Adoption of Plan

Official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy.

A review and update of this plan should occur in conjunction with the regional water planning groups update of the Lavaca Regional Water Plan as well as modify the five and ten-year targets modified as necessary.

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template

Wholesale Water Providers

**This Page
Intentionally Left Blank**

Model Water Conservation Plan Template – Wholesale Water Providers
Introduction and Background

Brief introduction describing WWP, its provided services, and general information.

1. Purpose

Purpose is to identify and establish principles, practices, and standards to effectively conserve and efficiently use available water supplies and water distribution system capacity.

Possibly provide historical annual average residential water demands and the goals for reduction in water demands included in the plan.

2. Location

General location of WWP and its service area

3. Customer Data

Population and Service Area Data

- Provide CCN certificate from TCEQ and service area map
- Provide service area size in square miles
- Provide current population of service area
- Provide current population served by utility (water, wastewater, etc.)
- Provide population served by utility for previous five years
- Provide projected population for service area for 2010, 2020, 2030, 2040, 2050
- Provide source/method of calculating current and projected populations

Active Connections

- Provide current number of active connections by user type and whether they are metered or not-metered (Metered Residential, Not-metered Residential, Metered Commercial, Not-metered Commercial, Metered Industrial, Not-metered Industrial, Metered Public, Not-metered Public, Metered Other, Not-metered Other)

- Provide net number of new connections/year for most recent three years by user type

High Volume Customers

- Provide annual water use for five highest volume retail and wholesale customers indicating if treated or raw water delivery

4. Water Use Data

Water Accounting Data

- Provide amount of water use monthly for previous five years in 1,000 gallons and indicate whether the water is raw water diverted or treated water distributed

- Provide source/method of obtaining monthly water use for previous five years
- Provide amount of water in 1,000 gallons delivered as recorded by user type (residential, commercial, industrial, wholesale, other)
- Provide previous five year records for unaccounted for water use
- Provide previous five year records for annual peak-to-average daily use ratio
- Provide municipal per capita water use for previous five years
- Provide seasonal water use for previous five years (gpd)

Projected Water Demands

- Provide total water demand estimates for utility's planning horizon indicating data sources/methods for determining water demand
- Discuss conservation measures already implemented, if any, including impacts of measures and methods of determination of impacts.

5. Water Supply System

Water Supply Sources

- Provide current water supply sources and amounts available for surface water, groundwater, contracts, and other

Treatment and Distribution System

- Provide design daily system capacity
- Provide storage capacity (elevated and ground)
- Provide description of water system including number of treatment plants, wells, storage tanks along with sketch of system
- Provide estimates of time before additional facilities for supply, storage, and pumping will be needed without conservation measures.

6. Wastewater Utility System

Wastewater System Data

- Provide design capacity of wastewater treatment plant
- Provide description of wastewater system in service area including TCEQ name, number of treatment plants, operator, owner, receiving stream of discharge if applicable.
- Provide sketch of plant and discharge point locations

Wastewater Data for Service Area

- Provide percent of water service area served by wastewater system
- Provide monthly volume treated for previous three years
- Provide quality information on treatment plant effluent for reuse applications
- Determine ratio between treated water pumped and wastewater flow

7. Utility Operating Data

Water and wastewater rates/ rate structure for all classes – provide list of rates

(Rates should be cost-based so that they do not promote the excessive use of water)

Other relevant data

8. Water Conservation Goals

Goals for WWPs established to maintain/reduce consumption measured in

- Gallons per capita per day used
- Unaccounted for water uses
- Peak day to average day ratio
- Increase in reuse or recycling of water

TCEQ/TWDB will assess conservation goals based on whether the following is addressed:

- Identification of a water/wastewater problem
- Completion of utility profile
- Selection of goals based on technical potential to save water as in utility profile
- Performance of cost-benefit analysis of strategies

Complete following (in gpcd) to quantify conservation goals for WWP's service area:

- Estimation for reducing per capita water use:
    - Reduction in unaccounted-for uses
    - Reduction in indoor water use due to water-conserving plumbing fixtures
    - Reduction in seasonal use
    - Reduction in water use due to public education program
- Planning goal (Specific quantified five and ten year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita day)
- A schedule for implementing the plan to achieve the applicant's targets and goals
- Needed reduction in per capita to meet planning goal

9. Water Conservation Plan Elements – Other Programs/BMPs That Should be Part of the Conservation Plan

Supplier:

- A method for tracking the implementation and effectiveness of the plan
- Metering Program
    - A master meter(s) to measure and account for the amount of water diverted from the source of supply
- Measures to Determine and Control Unaccounted for Water
    - Measures to determine and control unaccounted-for uses of water (e.g., periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections, abandoned services, etc.)
- Leak Detection and Repair (a program for leak detection, repair, and water loss accounting for the water storage, delivery, and distribution system in order to control unaccounted-for uses of water)
- Reservoir System Operating Plan
    - Water Rate Structure (should be conservation oriented)
- Program to assist agricultural customers in the development of conservation pollution prevention and abatement plans.
- Program for Reuse and Recycling of Wastewater and Greywater (if not feasible explain why)
- Any other conservation measure which the WWP shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

10. Regional Water Planning and Coordination

11. Authority and Adoption

Means of implementation and enforcement

Model Drought Contingency Plan Template

Utility/Water Supplier

**This Page
Intentionally Left Blank**

Model Drought Contingency Plan Template (Utility / Water Supplier)
Brief Introduction and Background

Include information such as

- Name of Utility
- Address, City, Zip Code
- CCN#
- PWS #s

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution (see Appendix C for an example).

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the

______________ (name of your water supplier) by means of ________________ (describe methods

used to inform the public about the preparation of the plan and provide opportunities for input; for

example, scheduling and providing public notice of a public meeting to accept input on the Plan).

Section III: Public Education

The ______________ (name of your water supplier) will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts).

Section IV: Coordination with Regional Water Planning Groups

The service area of the _____________ (name of your water supplier) is located within the ____________ (name of regional water planning area or areas) and ___________ (name of your water supplier) has provided a copy of this Plan to the ____________ (name of your regional water planning group or groups).

Section V: Authorization

The ____________________ (designated official; for example, the mayor, city manager, utility director, general manager, etc.), or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The ________________, (designated official) or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the ___________________ (name of your water supplier). The terms Aperson@ and Acustomer@ as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan**,** the following definitions shall apply:

<u>Aesthetic water use</u>: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

<u>Commercial and institutional water use</u>: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

<u>Conservation</u>: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

<u>Customer</u>: any person, company, or organization using water supplied by __________________ (name of your water supplier).

<u>Domestic water use</u>: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

<u>Even number address</u>: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

<u>Industrial water use</u>: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

<u>Landscape irrigation use</u>: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

<u>Non-essential water use</u>: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;

(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The ________________ (designated official) or his/her designee shall monitor water supply and/or demand conditions on a __________ (example: daily, weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified Atriggers@ are reached.

The triggering criteria described below are based on ______________________________________
____
(*provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits*).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation
Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VIIBDefinitions, when
____
(*Describe triggering criteria / trigger levels; see examples below*).

Following are examples of the types of triggering criteria that might be used in one or more successive stages of a drought contingency plan. One or a combination of such criteria must be defined for each drought response stage, but usually not all will apply. Select those appropriate to your system:

Example 1: *Annually, beginning on May 1 through September 30.*

Example 2: *When the water supply available to the _______ (name of your water supplier) is equal to or less than _______ (acre-feet, percentage of storage, etc.).*

Example 3: *When, pursuant to requirements specified in the _____________(name of* ***your*** *water supplier) wholesale water purchase contract with ____________ (name of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

Example 4: *When flows in the _______ (name of stream or river) are equal to or less than ____cubic feet per second.*

Example 5: *When the static water level in the ____________ (name of your water supplier) well(s) is equal to or less than _____ feet above/below mean sea level.*

Example 6: *When the specific capacity of the __________________ (name of your water supplier) well(s) is equal to or less than _____ percent of the well=s original specific capacity.*

Example 7: *When total daily water demand equals or exceeds ______ million gallons for ___consecutive days of ____ million gallons on a single day (example: based on the Asafe@ operating capacity of water supply facilities).*

Example 8: *Continually falling treated water reservoir levels which do not refill above __ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).*

The public water supplier may devise other triggering criteria which are tailored to its system.

<u>Requirements for termination</u>
Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g. 3) consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).
<u>Requirements for termination</u>
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination
Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when ____________ (designated official), or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**

2. Natural or man-made contamination of the water supply source(s).

Requirements for termination
Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation
Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when ____________ (describe triggering criteria, see examples in Stage 1).

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

Section IX: Drought Response Stages

The _______________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification
Notification of the Public:
The _________ (designated official) or his/ her designee shall notify the public by means of:

Examples:
publication in a newspaper of general circulation,
direct mail to each customer,
public service announcements,
signs posted in public places

take-home fliers at schools.

Additional Notification:
The _________ (designated official) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:
Mayor / Chairman and members of the City Council / Utility Board
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
County Judge & Commissioner(s)
State Disaster District / Department of Public Safety
TCEQ *(required when* mandatory *restrictions are imposed)*
Major water users
Critical water users, i.e. hospitals
Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in __________(example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

D*escribe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Voluntary Water Use Restrictions for Reducing Demand :

(a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.

(b) All operations of the ______________ (name of your water supplier) shall adhere to water use restrictions prescribed for Stage 2 of the Plan.

(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced *or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Water Use Restrictions for Demand Reduction:

Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

(a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the ____________________ (name of your water supplier).

(f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the ________________ (name of your water supplier), the facility shall not be subject to these regulations.

(g) All restaurants are prohibited from serving water to patrons except upon request of the patron.

(h) The following uses of water are defined as non-essential and are prohibited:

1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
2. use of water to wash down buildings or structures for purposes other than immediate fire protection;

3. use of water for dust control;
4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Demand Reduction</u>:
All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the ____________________ (name of your water supplier).

(c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand:</u>. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.

(c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

(a) Irrigation of landscaped areas is absolutely prohibited.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the ____________ (designated official) is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

"Household" means the residential premises served by the customer's meter. "Persons per household" include only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer's household is comprised of two (2) persons unless the customer notifies the _____________ (name of your water supplier) of a greater number of persons per household on a form prescribed by the ____________ designated official). The _________ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the ____________ (name of your water supplier) offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the __________ (designated official). When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the _________ (name of water supplier) on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the _________(name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the _________ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the ____________ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than $________.

Residential water customers shall pay the following surcharges:

$____ for the first 1,000 gallons over allocation.
$____ for the second 1,000 gallons over allocation.
$____ for the third 1,000 gallons over allocation.
$____ for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (example: apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the ____________ (name of your water supplier) of a greater number on a form prescribed by the __________ (designated official). The _________ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the ____________ (name of your water supplier) offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the __________ (designated official). If the number of dwelling units served by a master meter is reduced, the customer shall notify the _________(name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the _________ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the ____________ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than $________. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

$____ for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.
$____, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.
$____, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.
$ ____, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the __________ (designated official), or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately __ (e.g. 75%) percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, __ percent of whose monthly usage is less than ____ gallons, shall be allocated ____ gallons. The _________ (designated official) shall give his/her best effort to see that notice of each non-residential customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the ____________ (name of your water supplier) to determine the allocation. Upon request of the customer or at the initiative of the ___________ (designated official), the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ (designated official or alternatively, a special water allocation review committee). Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through ______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.
$____ per thousand gallons for the second 1,000 gallons over allocation.
$____ per thousand gallons for the third 1,000 gallons over allocation.
$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the

allocation up through 5 percent above allocation.
___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, “block rate” means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Industrial Customers

A monthly water allocation shall be established by the __________ (designated official), or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer=s allocation shall be approximately __ (example: 90%) percent of the customer=s water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer=s allocation shall be further reduced to __ (example: 85%) percent of the customer=s water usage baseline. The industrial customer=s water use baseline will be computed on the average water use for the ______ month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer=s billing history is shorter than ___ months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The _________ (designated official) shall give his/her best effort to see that notice of each industrial customer=s allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer=s responsibility to contact the ____________ (name of your water supplier) to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the ___________ (designated official), the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer=s normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ (designated official or alternatively, a special water allocation review committee). Industrial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through _______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.
$____ per thousand gallons for the second 1,000 gallons over allocation.
$____ per thousand gallons for the third 1,000 gallons over allocation.
$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.

___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, Ablock rate@ means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer=s allocation.

Section X: Enforcement

(a) No person shall knowingly or intentionally allow the use of water from the __________________ (name of your water supplier) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _____________(designated official), or his/her designee, in accordance with provisions of this Plan.

(b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than _______ dollars ($__) and not more than ______ dollars ($__). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the _____________ (designated official) shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $______, and any other costs incurred by the ___________________ (name of your water supplier) in discontinuing service. In addition, suitable assurance must be given to the ________________ (designated official) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

(c) Any person, including a person classified as a water customer of the ______________ (name of your water supplier), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person=s property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents= control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

d) Any employee of the _______________ (name of your water supplier), police officer, or other _____ employee designated by the ___________ (designated official), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the _____________ (example: municipal court) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator=s immediate family or is a resident of the violator=s residence. The alleged violator shall appear in _________ (example: municipal court) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in __________ (example: municipal court), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in __________ (example: municipal court) before all other cases.

Section XI: Variances

The ________________ (designated official), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _________________ (name of your water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the __________ (designated official), or his/her designee, and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers are limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the *Texas Water Code* and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________ (name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit "A" and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____

President, Board of Directors
ATTESTED TO:

____
Secretary, Board of Directors

**This Page
Intentionally Left Blank**

Model Drought Contingency Plan Template
Irrigation Uses

**This Page
Intentionally Left Blank**

Model Drought Contingency Plan Template (Irrigation Uses)

DROUGHT CONTINGENCY PLAN
FOR
(Name of irrigation district)
(Address)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

The Board of Directors of the ___________________ (name of irrigation district) deems it to be in the interest of the District to adopt Rules and Regulations governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, *Vernon's Texas Codes Annotated*, and associated administrative rules of the Texas Commission on Environmental Quality (Title 30, Texas Administrative Code, Chapter 288).

Section II: User Involvement

Opportunity for users of water from the _________________ (name of irrigation district) was provided by means of ________________ (describe methods used to inform water users about the preparation of the plan and opportunities for input; for example, scheduling and providing notice of a public meeting to accept user input on the plan).

Section III: User Education

The _____________ (name of irrigation district) will periodically provide water users with information about the Plan, including information about the conditions under which water allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of ______________ (e.g. describe methods to be used to provide water users with information about the Plan; for example, by providing copies of the Plan and by posting water allocation rules and regulations on the district's public bulletin board).

Section IV: Authorization

The ______________ (e.g., general manager) is hereby authorized and directed to implement the applicable provision of the Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

Section V: Application

The provisions of the Plan shall apply to all persons utilizing water provided by the _______________ (name of irrigation district). The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

Section VI: Initiation of Water Allocation

The __________ (designated official) shall monitor water supply conditions on a __________ (e.g. weekly, monthly) basis and shall make recommendations to the Board regarding irrigation of water allocation. Upon approval of the Board, water allocation will become effective when _________________ (describe the criteria and the basis for the criteria):

Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

Example 1: **Water in storage in the ___________ (name of reservoir) is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).**

Example 2: **Combined storage in the _________________ (name or reservoirs) reservoir system is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).**

Example 3: **Flows as measured by the U.S. Geological Survey gage on the _____________ (name of reservoir) near _________________ ______________, Texas reaches ____ cubic feet per second (cfs).**

Example 4: **The storage balance in the district's irrigation water rights account reaches ______ acre-feet.**

Example 5: **The storage balance in the district's irrigation water rights account reaches an amount equivalent to _______ (number) irrigations for each flat rate acre in which all flat rate assessments are paid and current.**

Example 6: **The ____________ (name of entity supplying water to the irrigation district) notifies the district that water deliveries will be limited to ___________ acre-feet per year (i.e. a level below that required for unrestricted irrigation).**

Section VII: Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section IV of the Plan no longer exist and the Board deems that the need to allocate water no longer exists.

Section VIII: Notice

Notice of the initiation of water allocation will be given by notice posted on the District's public bulletin board and by mail to each ________ (e.g. landowner, holders of active irrigation accounts, etc.).

Section IX: Water Allocation

(a) In identifying **specific, quantified targets** for water allocation to be achieved during periods of water shortages and drought, each irrigation user shall be allocated _____ irrigations or ________ acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each irrigation account will be expressed in acre-feet of water.

Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.

(b) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those irrigation users having ________________.

Example 1: **An account balance of less than ______ irrigations for each flat**

rate acre (i.e. ____ acre-feet).

Example 2: **An account balance of less than _____ acre-feet of water for each flat rate acre.**

Example 3: **An account balance of less than _ ___ acre-feet of water.** (c) The amount of water charged against a user's water allocation will be ____ (e.g. eight inches) per irrigation, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of ____ percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than eight (8) inches per acre shall be credited back to the allocation unit and will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users irrigation account.

(d) Acreage in an irrigation account that has not been irrigated for any reason within the last two (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two (2) consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

Section X: Transfers of Allotments

(a) A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

(b) A water allocation may not be transferred to land owned by a landowner outside the District boundaries.

or

A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.

(c) Water from outside the District may not be transferred by a landowner for use within the District.

or

Water from outside the District may be transferred by a landowner for use within the

District. The District will divert and deliver the water on the same basis as District water is delivered, except that a ___ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

Section XI: Penalties

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of these Rules and Regulations, shall be considered in violation of Section 11.0083, Texas Water Code, *Vernon's Texas Codes Annotated*, which provides for punishment by fine of not less than $10.00 nor more than $200.00 or by confinement in the county jail for not more than thirty (30) days, or both, for each violation, and these penalties provided by the laws of the State and may by enforced by complaints filed in the appropriate court jurisdiction in ______ County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Rules and Regulations.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the _____________ (name of irrigation district) that the sections, paragraphs, sentences, clauses, and phrases of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Section XIII: Authority

The foregoing rules and regulations are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated.*

Section XIV: Effective Date of Plan

The effective date of this Rule shall be five (5) days following the date of Publication hereof and ignorance of the Rules and Regulations is not a defense for a prosecution for enforcement of the violation of the Rules and Regulations.

EXAMPLE RESOLUTION FOR ADOPTION OF A DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________(name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit AA@ and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____
President, Board of Directors

ATTESTED TO:

____
Secretary, Board of Director

**This Page
Intentionally Left Blank**

Model Drought Contingency Plan Template

Wholesale Water Providers

**This Page
Intentionally Left Blank**

Model Drought Contingency Plan Template (**Wholesale Public Water Suppliers**)

DROUGHT CONTINGENCY PLAN
FOR THE
(Name of wholesale water supplier)
(address)
(CCN)
(PWS)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) adopts the following Drought Contingency Plan (the Plan).

Section II: Public Involvement

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by _____________ (name of your water supplier) by means of ______________ (describe methods used to inform the public and wholesale customers about the preparation of the plan and opportunities for input; for example, scheduling and proving public notice of a public meeting to accept input on the Plan).

Section III: Wholesale Water Customer Education

The ____________ (name of your water supplier) will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (e.g., describe methods to be used to provide customers with information about the Plan; for example, providing a copy of the Plan or periodically including information about the Plan with invoices for water sales).

Section IV: Coordination with Regional Water Planning Groups

The water service area of the ______________ (name of your water supplier) is located within the _______________ (name of regional water planning area or areas) and the _____________ (name of your water supplier) has provided a copy of the Plan to the ____________ (name of your regional water planning group or groups).

Section V: Authorization

The ___________________ (designated official; for example, the general manager or executive director), or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all customers utilizing water provided by the __________________ (name of your water supplier). The terms Aperson@ and Acustomer@ as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Criteria for Initiation and Termination of Drought Response Stages

The ____________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a (e.g., weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed.

The triggering criteria described below are based on:
____
____ (provide a brief description of the rationale for the triggering criteria; for example, triggering criteria are based on a statistical analysis of the vulnerability *of the water source under drought of record conditions).*

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation -- The _____________ (name of your water supplier) will recognize that a mild water shortage condition exists when______________(*describe triggering criteria, see examples below).*

> ***Below are examples of the types of triggering criteria that might be used in a wholesale water supplier=s drought contingency plan. One or a combination of such criteria may be defined for each drought response stage:***
>
> ***Example 1:*** ***Water in storage in the _________ (name of reservoir) is equal to or less than _______ (acre-feet and/or percentage of storage capacity).***
>
> ***Example 2:*** ***When the combined storage in the __________ (name of reservoirs) is equal to or less than ______ (acre-feet and/or percentage of storage capacity).***
>
> ***Example 3:*** ***Flows as measured by the U.S. Geological Survey gage on the ________ (name of river) near ________, Texas reaches ___ cubic feet per second (cfs).***

Example 4: ***When total daily water demand equals or exceeds ______ million gallons for ___consecutive days or ____ million gallons on a single day.***

Example 5: ***When total daily water demand equals or exceeds ___ percent of the safe operating capacity of ____________ million gallons per day for ___consecutive days or ___ percent on a single day.***

Requirements for termination **-** Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _________ (name of water supplier) will notify its wholesale customers and the media of the termination of Stage 1 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation B The _____________ (name of your water supplier) will recognize that a moderate water shortage condition exists when______________(describe triggering criteria).

Requirements for termination **-** Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation B The _____________ (name of your water supplier) will recognize that a severe water shortage condition exists when______________(*describe triggering criteria; see examples in Stage 1*).

Requirements for termination **-** Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 3 of the Plan.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation - The _____________ (name of your water supplier) will recognize that an emergency water shortage condition exists when______________(*describe triggering criteria*; *see examples below*).

Example 1. ***Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or***

Example 2. ***Natural or man-made contamination of the water supply source(s).***

Requirements for termination **-** Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The

_________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 4.

Section VIII: Drought Response Stages

The _________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions and, in accordance with the triggering criteria set forth in Section VI, shall determine that mild, moderate, or severe water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary __ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate voluntary measures to reduce water use (e.g., implement Stage 1 of the customer=s drought contingency plan).

(b) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.

(b) The ________________ (designated official), or his/her designee(s), will request wholesale water customers to initiate mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer=s drought contingency plan).

(c) The _________________ (designated official), or his/her designee(s), will initiate preparations for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer according to the procedures specified in Section VI of the Plan.

(d) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer=s drought contingency plan).

(b) The _________________ (designated official), or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer according to the procedures specified in Section VI of the Plan.

(c) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 4 Response -- EMERGENCY Water Shortage Conditions

Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the _______________ (designated official) shall:

1. Assess the severity of the problem and identify the actions needed and time required to solve the problem.

2. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems (e.g., notification of the public to reduce water use until service is restored).

3. If appropriate, notify city, county, and/or state emergency response officials for assistance.

4. Undertake necessary actions, including repairs and/or clean-up as needed.

5. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions.

Section IX: Pro Rata Water Allocation

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 B Severe Water Shortage Conditions have been met, the ____________ (designated official) is hereby authorized initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code Section 11.039.

Section X: Enforcement

During any period when pro rata allocation of available water supplies is in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation up through 5 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 5 percent through 10 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 10 percent through 15 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries more than 15 percent above the monthly allocation.

The above surcharges shall be cumulative.

Section XI: Variances

The ________________ (designated official), or his/her designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the public health, welfare, or safety and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the _________________ (designated official) within 5 days after pro rata allocation has been invoked. All petitions for variances shall be reviewed by the __________ (governing body), and shall include the following:

(a) Name and address of the petitioner(s).
(b) Detailed statement with supporting data and information as to how the pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(c) Description of the relief requested.
(d) Period of time for which the variance is sought.
(e) Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(f) Other pertinent information.

Variances granted by the ___________________ (governing body) shall be subject to the following conditions, unless waived or modified by the ____________ (governing body) or its designee:

(a) Variances granted shall include a timetable for compliance.
(b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XII: Severability

It is hereby declared to be the intention of the ________________ (governing body of your water supplier) that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the ____________________ (governing body of your water supplier) without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

If you have any questions on how to fill out this form or about the ____________________________ program, please contact us at 512/239-_______.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.
CITY ATTORNEY

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the *Texas Water Code* and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________(name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as "Exhibit A" and made

part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____

President, Board of Directors

ATTESTED TO:

____

Secretary, Board of Directors

**This Page
Intentionally Left Blank**

Appendix 6A

Water Conservation Survey Letter

This Page Intentionally
Left Blank

TO POLITICAL SUBDIVISIONS WITH WATER NEEDS IN REGION H

The Region H Water Planning Group (RHWPG) is currently updating the Regional Water Plan. The RHWPG is recommending a combination of water conservation, expanded use of groundwater and new or existing surface water supplies to meet the projected water demands.

As part of the Region H Consulting Team, KBR is conducting a survey of water conservation best management practices. The goal is to determine the efficacy and cost of water conservation best management practices implemented and identify planned water conservation measures that have not yet been implemented.

Please return the completed survey by May 15, 2009 to:

Region H Water Planning Group
c/o Karim El Kheiashy, PhD, P.E.
KBR .
4100 Clinton Drive
Houston, Texas 77020
713-753-3803 facsimile
E-mail address: Karim.ElKheiashy@kbr.com

If you have any questions regarding this survey, please contact:
Karim El Kheiashy at 713-753-3631.

This Page

Intentionally Left Blank

Region H Water Planning Group
Water Conservation & Drought Management Methods Survey
Please Return by: April 15, 2009

Water User Group (WUG)/City Name **Contact Person:** **Telephone Number:** **Fax:** **Email Address:** **Mailing Address:**
1. What is the WUG's average water demand per capita?
2. What programs are currently in place for water conservation measures for the WUG?
3. Which conservation measures have been used in the past? **(Please Indicate on the attached Water Conservation Survey form)**
4. What are the measurable impacts of these conservation methods? **(Please Indicate on the attached Water Conservation Survey form)**
5. What is the expected efficacy from these current water conservation methods that are being implemented? **(Please Indicate on the attached Water Conservation Survey form)**
6. What additional conservation measures are planned and what is the expected efficacy? **(Please Indicate on the attached Water Conservation Survey form)**

9. Approximately what is the current annual budget for water conservation measures? **(Please Indicate on the attached Water Conservation Survey form)**
8. Have you coordinated your public outreach programs with any other water providers? If so, please list which providers that you have partnered with.
9. Have you revised your Water Conservation and/or Drought Contingency Plan since 2006? If so, please provide a copy of this plan with your responses to this survey.
10. Do you have any additional comments relating to water conservation?

Conservation Best Management Practices	Has this strategy been Implemented? (Circle One)		Effectiveness (Circle One)					Annual Water Savings		Date Implemented?	Water Conservation Measure Costs		If this strategy has not been implemented, would you consider implementing this strategy? (Circle One)	
			Not Effective	…	Somewhat Effective	…	Very Effective	Amount	Units		Startup Cost	Annual Cost		
Municipal Uses														
Water System Audits, Leak Detection	Y	N	1	2	3	4	5						Y	N
Water Conservation Pricing	Y	N	1	2	3	4	5						Y	N
Prohibition on Wasting Water	Y	N	1	2	3	4	5						Y	N
Low Flow Plumbing Rules	Y	N	1	2	3	4	5						Y	N
Residential Clothes Washer Incentive Program	Y	N	1	2	3	4	5						Y	N
School Education	Y	N	1	2	3	4	5						Y	N
Athletic Field & Golf Course Conservation	Y	N	1	2	3	4	5						Y	N
Industrial Uses														
Industrial Water Audit	Y	N	1	2	3	4	5						Y	N
Industrial Water Waste Reduction	Y	N	1	2	3	4	5						Y	N
Alternative Sources and Reuse of Process Water	Y	N	1	2	3	4	5						Y	N
Industrial Landscape	Y	N	1	2	3	4	5						Y	N
Industrial Site Specific Conservation	Y	N	1	2	3	4	5						Y	N
Agricultural Uses														
Irrigation Scheduling	Y	N	1	2	3	4	5						Y	N
On-Farm Irrigation Audit	Y	N	1	2	3	4	5						Y	N
Land Leveling	Y	N	1	2	3	4	5						Y	N
Linning of Irrigation District Canals	Y	N	1	2	3	4	5						Y	N
Linning of On-Farm Irrigation Ditches	Y	N	1	2	3	4	5						Y	N
Replacement of Irrigation District Canals with Pipelines	Y	N	1	2	3	4	5						Y	N
Replacement of On-Farm Irrigation Ditches with Pipelines	Y	N	1	2	3	4	5						Y	N
Drip/Micro Irrigation System	Y	N	1	2	3	4	5						Y	N
Tailwater Recovery and Reuse	Y	N	1	2	3	4	5						Y	N
Others (indicate: Municipal, Industrial or Agricultural)														
	Y	N	1	2	3	4	5						Y	N
	Y	N	1	2	3	4	5						Y	N
	Y	N	1	2	3	4	5						Y	N
	Y	N	1	2	3	4	5						Y	N
	Y	N	1	2	3	4	5						Y	N
	Y	N	1	2	3	4	5						Y	N

Appendix 6B

Water Conservation Survey Results

This Page Intentionally
Left Blank

Table 6B-1: Current and Future Considered Water Conservation Strategies

No.	WUG	Population	Type	Conservation WMS in 2006 Plan	MUNICIPAL USES	Water System Audits, Leak Detection	Water Conservation Pricing	Prohibition on Wasting Water	Low Flow Plumbing Rules	Residential Clothes Washer Incentive Program	School Education	Athletic Field & Golf Course Conservation	INDUSTRIAL USES	Industrial Water Audit	Industrial Water Waste Reduction	Alternative Sources and Reuse of Process Water	Industrial Landscape	Industrial Site Specific Conservation	AGRICULTURAL USES	Irrigation Scheduling	On-Farm Irrigation Audit	Land Leveling	Linning of Irrigation District Canals	Linning of On-Farm Irrigation Ditches	Replacement of Irrigation District Canals and Lateral Canals with Pipelines	Replacement of On-Farm Irrigation Ditches with Pipelines	Drip/Micro Irrigation System	Tailwater Recovery and Reuse	5 - Year Goal	10 - Year Goal
	Percent Use					0.43	0.43	0.20	0.14	0.00	0.31	0.06		0.06	0.00	0.09	0.00	0.03		0.06	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00		
	Percent Future Use					0.14	0.06	0.20	0.17	0.14	0.17	0.17		0.11	0.11	0.06	0.09	0.06		0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Average Rating					3.92	3.55	2.75	3.50	0.00	3.50	0.00		3.00	0.00	3.50	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
1	Broo s ire Municipal Water District	4,616	Type 2	2050			X	X																						
2	Clear La e City Water Aut ority	-	Type 2	-		X			X			X																		
3	City of Sugarland	83,819	Type 3	No		X	X	X	X	F	X	F		F	F	X	F	F												
4	City of Sweeny	3,895	Type 2	No		F					F																			
5	City of Ana uac	2,405	Type 2	No																										
6	City of Pasadena	161,678	Type 3	No		X			X		X																			
7	Plantation MUD	4,333	Type 2	2000		X	X																							
8	City of Cut and S oot	1,515	Type 1	2010		X	F	F	F		F			F																
9	Harris County FWSD #47	4,290	Type 2	2000		X	X				X																			
10	City of Rosenburg	37,420	Type 3	2000		F	X	X	X		X	F		F	F	F	F	F												
11	Grean Trails Municipal Utility District	2,694	Type 1	2010			X																							
12	Spring Cree Utility District	5,326	Type 2	2010		X	X	F	F	F	F	F																		
13	Bacliff Mud	7,816	Type 2	No		X		F	F		F					X														
14	City of Wallis	1,335	Type 1	No																										
15	Montgomer County WCID #1	4,157	Type 2	2010			X		F																					
16	City of Buffalo Water Wor s	2,074	Type 1	No																										
17	SMC MUD	11,087	Type 3	No		F	X	F	F	F	F									F										
18	HD MUD 54	-	Type 2	No			X	X																						
19	Riverside	6,489	Type 2	No			X	F						X																
20	WHC MUD 6	3,500	Type 2	2010			X																							
21	Village of Jones Cree	2,130	Type 1	No																										
22	HCMUD 345	5,285	Type 2	2010																										
23	City of Sealy	7,902	Type 2	No		X	X	X	X	F	F			X	F	F	F	X		X										
24	Harris County WCID 36	10,451	Type 3	2000		X	X	X			X			F	F															
25	La e Livingston WSC	22,120	Type 3	No		X																								
26	San Jacinto Water Supply	3,697	Type 2	No		X																								
27	City of Beasley	701	Type 1	2030																										
28	City of Cleveland	7,930	Type 2	No		F		X			X	F																		
29	HMW SUD	11,464	Type 3	No																										
30	City of Houston	-	-	2010		X					X	X																		
31	WHCRWA	-	-	-		X	F	F	F	F	X	F																		
32	NHCRWA	-	-	-							X					X														
33	NFBWA	-	-	-		F	X	F			X	F																		
34	CLCND	-	-	-																X		X								
35	BRA	-	-	-		X					X																			

NOTE
X Current Water Conservation Met od
F Considered for Future Implementation

Region H
Table 6B-2: Estimated water Savings from Water Conservation Measures

No.	WUG	Population	Type	Conservation WMS in 2006 Plan?	MUNICIPAL USES	Water System Audits, Leak Detection	Water Conservation Pricing	Prohibition on Wasting Water	Low Flow Plumbing Rules	Residential Clothes Washer Incentive Program	School Education	Athletic Field & Golf Course Conservation	INDUSTRIAL USES	Industrial Water Audit	Industrial Water Waste Reduction	Alternative Sources and Reuse of Process Water	Industrial Landscape	Industrial Site Specific Conservation	AGRICULTURAL USES	Irrigation Scheduling	On-Farm Irrigation Audit	Land Leveling	Linning of Irrigation District Canals	Linning of On-Farm Irrigation Ditches	Replacement of Irrigation District Canals and Lateral Canals with Pipelines	Replacement of On-Farm Irrigation Ditches with Pipelines	Drip/Micro Irrigation System	Tailwater Recovery and Reuse	5 - Year Goal	10 - Year Goal
Type 1																														
1	City of Cut and Shoot	1,515	Type 1	2010		unknown																								
2	Grean Trails Municipal Utility District	2,694	Type 1	2010			5%																							
3	City of Wallis	1,335	Type 1	No																										
4	City of Buffalo Water Works	2,074	Type 1	No																										
5	Village of Jones Creek	2,130	Type 1	No																										
6	City of Beasley	701	Type 1	2030																										
Type 2																														
7	Brookshire Municipal Water District	4,616	Type 2	2050			1	1																						
8	Clear Lake City Water Authority	-	Type 2			1			1			1																		
9	City of Anahuac	2,405	Type 2	No																										
10	Plantation MUD	4,333	Type 2	2000																										
11	Harris County FWSD #47	4,290	Type 2	2000		8.3 afy										20 afy														
12	Spring Creek Utility District	5,326	Type 2	2010		1	1																						4%	18%
13	Bacliff Mud	7,816	Type 2	No		1										1														
14	Montgomer County WCID #1	4,157	Type 2	2010			1																							
15	HD MUD 54	-	Type 2	No			1	1																						
16	Riverside	6,489	Type 2	No										1%																
17	WHC MUD 6	3,500	Type 2	2010		N/A																								
18	HCMUD 345	5,285	Type 2	2010																										
19	City of Sealy	7,902	Type 2	No		1	1	1	1					1				1		1										
20	San Jacinto Water Supply	3,697	Type 2	No																										
21	City of Cleveland	7,930	Type 2	No				1			1																			
Type 3																														
22	City of Sugarland	83,819	Type 3	No		153 afy					230 afy					306 afy														
23	City of Sweeny	3,895	Type 2	No																										
24	City of Pasadena	161,678	Type 3	No		1534 afy																								
25	City of Rosenburg	37,420	Type 3	2000												37 afy														
26	SMC MUD	11,087	Type 3	No			1																						3%	12%
27	Harris County WCID 36	10,451	Type 3	2000		20%																								
28	Lake Livingston WSC	22,120	Type 3	No		?																								
29	HMW SUD	11,464	Type 3	No																										
30	City of Houston	-	-																											
31	WHCRWA	-	-			1					1																		1%	2%
32	NHCRWA	-	-				1				1																			
33	NFBWA	-	-																											
34	CLCND	-	-																											
35	BRA	-	-																											

Region H
Table 6B-3: Water Conservation Capital Costs

No.	WUG	Population	Type	Conservation WMS in 2006 Plan?		Water System Audits, Leak Detection	Water Conservation Pricing	Prohibition on Wasting Water	Low Flow Plumbing Rules	Residential Clothes Washer Incentive Program	School Education	Athletic Field & Golf Course Conservation		Industrial Water Audit	Industrial Water Waste Reduction	Alternative Sources and Reuse of Process Water	Industrial Landscape	Industrial Site Specific Conservation		Irrigation Scheduling	On-Farm Irrigation Audit	Land Leveling	Linning of Irrigation District Canals	Linning of On-Farm Irrigation Ditches	Replacement of Irrigation District Canals and Lateral Canals with Pipelines	Replacement of On-Farm Irrigation Ditches with Pipelines	Drip/Micro Irrigation System	Tailwater Recovery and Reuse	5 - Year Goal	10 - Year Goal
Type 1																														
1	City of Cut and Shoot	1,515	Type 1	2010		1																								
2	Grean Trails Municipal Utility District	2,694	Type 1	2010			500																							
3	City of Wallis	1,335	Type 1	No																										
4	City of Buffalo Water Works	2,074	Type 1	No																										
5	Village of Jones Creek	2,130	Type 1	No																										
6	City of Beasley	701	Type 1	2030																										
Type 2																														
7	Brookshire Municipal Water District	4,616	Type 2	2050			1	1																						
8	Clear Lake City Water Authority	-	Type 2			1			1			1																		
9	City of Anahuac	2,405	Type 2	No																										
10	Plantation MUD	4,333	Type 2	2000		1	1																							
11	Harris County FWSD #47	4,290	Type 2	2000		N/A	1000									5000														
12	Spring Creek Utility District	5,326	Type 2	2010																										
13	Bacliff Mud	7,816	Type 2	No		1										1														
14	Montgomer County WCID #1	4,157	Type 2	2010			1																							
15	HD MUD 54	-	Type 2	No			1	1																						
16	Riverside	6,489	Type 2	No										1300																
17	WHC MUD 6	3,500	Type 2	2010																										
18	HCMUD 345	5,285	Type 2	2010																										
19	City of Sealy	7,902	Type 2	No		1	1	1	1					1				1												
20	San Jacinto Water Supply	3,697	Type 2	No		1	1																							
21	City of Cleveland	7,930	Type 2	No				1			1																			
Type 3																														
22	City of Sugarland	83,819	Type 3	No		?	?	?	?		35000					?														
23	City of Sweeny	3,895	Type 2	No																										
24	City of Pasadena	161,678	Type 3	No		225000																								
25	City of Rosenburg	37,420	Type 3	2000												250000														
26	SMC MUD	11,087	Type 3	No			1																							
27	Harris County WCID 36	10,451	Type 3	2000		1	1				1																			
28	Lake Livingston WSC	22,120	Type 3	No		2000																								
29	HMW SUD	11,464	Type 3	No																										
30	City of Houston	-	-																											
31	WHCRWA	-	-																											
32	NHCRWA	-	-																											
33	NFBWA	-	-																											
34	CLCND	-	-																											
35	BRA	-	-																											

Region H

Table 6B-4: Conservtion Measure Annual Costs

No.	WUG	Population	Type	Conservation WMS in 2006 Plan?	Water System Audits, Leak Detection	Water Conservation Pricing	Prohibition on Wasting Water	Low Flow Plumbing Rules	Residential Clothes Washer Incentive Program	School Education	Athletic Field & Golf Course Conservation	Industrial Water Audit	Industrial Water Waste Reduction	Alternative Sources and Reuse of Process Water	Industrial Landscape	Industrial Site Specific Conservation	Irrigation Scheduling	On-Farm Irrigation Audit	Land Leveling	Linning of Irrigation District Canals	Linning of On-Farm Irrigation Ditches	Replacement of Irrigation District Canals and Lateral Canals with Pipelines	Replacement of On-Farm Irrigation Ditches with Pipelines	Drip/Micro Irrigation System	Tailwater Recovery and Reuse	Total
Type 1																										
1	City of Cut and Shoot	1,515	Type 1	2010																						300
2	Grean Trails Municipal Utility District	2,694	Type 1	2010																						
3	City of Wallis	1,335	Type 1	No																						
4	City of Buffalo Water Works	2,074	Type 1	No																						
5	Village of Jones Creek	2,130	Type 1	No																						
6	City of Beasley	701	Type 1	2030																						
Type 2																										
7	Brookshire Municipal Water District	4,616	Type 2	2050		1	1																			
8	Clear Lake City Water Authority	-	Type 2		1			1			1															
9	City of Anahuac	2,405	Type 2	No																						
10	Plantation MUD	4,333	Type 2	2000	1	1																				
11	Harris County FWSD #47	4,290	Type 2	2000	30000	500								1000												
12	Spring Creek Utility District	5,326	Type 2	2010	500																					
13	Bacliff Mud	7,816	Type 2	No	1									1												
14	Montgomer County WCID #1	4,157	Type 2	2010		1																				
15	HD MUD 54	-	Type 2	No		1	1																			
16	Riverside	6,489	Type 2	No																						
17	WHC MUD 6	3,500	Type 2	2010																						
18	HCMUD 345	5,285	Type 2	2010																						
19	City of Sealy	7,902	Type 2	No	1	1	1	1				1				1	1									
20	San Jacinto Water Supply	3,697	Type 2	No																						6000
21	City of Cleveland	7,930	Type 2	No			1			1																
Type 3																										
22	City of Sugarland	83,819	Type 3	No	?	?	?	?		50000 - 75000				50000 - 100000												
23	City of Sweeny	3,895	Type 2	No																						
24	City of Pasadena	161,678	Type 3	No																						
25	City of Rosenburg	37,420	Type 3	2000										?												
26	SMC MUD	11,087	Type 3	No		1																				
27	Harris County WCID 36	10,451	Type 3	2000	1	1	1			1																
28	Lake Livingston WSC	22,120	Type 3	No	2000																					
29	HMW SUD	11,464	Type 3	No																						
30	City of Houston	-	-							295000																295000
31	WHCRWA	-	-		10000					250000																
32	NHCRWA	-	-							250000																
33	NFBWA	-	-																							
34	CLCND	-	-																							
35	BRA	-	-																							

Contents

List of Tables

List of Figures

Appendices

**This Page
Intentionally Left Blank**

Chapter 7 – Long-Term Protection of the State's Water Resources, Agricultural Resources and Natural Resources

The Region H Water Planning Group balanced meeting water needs with good stewardship of the water, agricultural and natural resources within the region. The RHWPG recommended water conservation as the first strategy applied to meet every projected shortage. In the strategy selection process, the yield and environmental impact of projects were given greater consideration than the unit cost of water.

In this plan, existing in-basin supplies are fully utilized prior to recommending new water supply projects or interbasin transfers. In the new interbasin transfer strategies, only the minimum amount of water supply required to meet the projected demands is recommended. Wastewater reuse is a recommended strategy in Harris County as an alternative to the importation of additional water supplies.

The RHWPG believes that local groundwater conservation districts are best-suited to manage groundwater resources in which the individual districts have the responsibility to regulate. This plan recommends using groundwater up to the local sustainable yield or to the restrictive limit established under subsidence district regulations, to meet local demands, but does not recommend the exportation of groundwater from its county of origin.

The affects of the recommended water management strategies on specific resources are discussed in further detail within this chapter.

7.1 Water Resources within Region H

Water resources available by basin within Region H are discussed in further detail below.

7.1.1 Neches-Trinity Coastal Basin

The Neches-Trinity Coastal Basin has numerous creeks and bayous which flow into East Bay. Many of these creeks and bayous provide water for irrigation and it is expected that this irrigation use will continue. Additional supplies are transferred into the Neches-Trinity Basin by the Lower Neches Valley Authority (water from the Sam Rayburn Reservoir – B.A. Steinhagen Lake System) and by the Chambers-Liberty Counties Navigation District (CLCND) (water from the Trinity River). This plan recommends the reallocation of existing supplies before increasing the transfer of water from the Trinity to meet the projected demands. Additional supplies from the Trinity are not recommended, which will affect the return flows location within Galveston Bay. No other impacts by these strategies are foreseen.

Groundwater supplies within the Neches-Trinity Basin come from the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

7.1.2 Trinity River Basin

The Trinity River serves both Regions C and H. Within Region H, the Lake Livingston-Wallisville Saltwater Barrier System represents one half of the available surface water supply. This plan recommends using approximately 95% of the firm yield of this system, in addition to the full use of all water rights below the Lake. Achieving the full yield of Lake Livingston is dependent upon return flows from the upper basin. Region C is recommending wastewater reuse as a water management strategy (WMS) in the upper basin, which will limit these flows, but is also recommending the import of new supplies into the upper basin. As discussed in *Chapter 3* and *Appendix 3C*, return flows from the upper basin are projected to decrease from 2020 to 2040 due to increased reuse. As demands in the upper basin increase in 2050 and 2060, return flows are projected to rise. In combination, the upper basin additional supply and reuse strategies should have a long-term neutral effect on the Lake Livingston supply.

This plan recommends transferring much of the Trinity River supply west into the adjacent coastal basin and the San Jacinto Basin. This will result in decreased flows in the lower Trinity Basin during drought periods. Senior water rights below Lake Livingston are protected by the Lake's operating rules. Return flows from these transfers will still reach Galveston Bay, but will return via the San Jacinto Basin.

Groundwater in the lower Trinity Basin predominantly comes from the Gulf Coast Aquifer as well as from the Carrizo-Wilcox, the Sparta, the Queen City and the Yegua-Jackson Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this area. In addition, the other aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan.

7.1.3 Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto Coastal Basin is relatively small, with Cedar Creek being the most significant stream. There are several surface water rights for irrigation within the basin along with a substantial saline water right for cooling water from Galveston Bay. Both of these uses are expected to continue throughout the planning period. This plan recommends the reallocation of existing supplies before increasing the transfer of water from the Trinity River to meet the projected demands, which will affect the return flows location within Galveston Bay. No other impacts from the transfers are foreseen.

The groundwater supply source within this basin is the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin. In Harris County, the Harris-Galveston Subsidence District regulations further restrict the use of groundwater to address land subsidence. These groundwater pumpage restrictions are reflected in the plan.

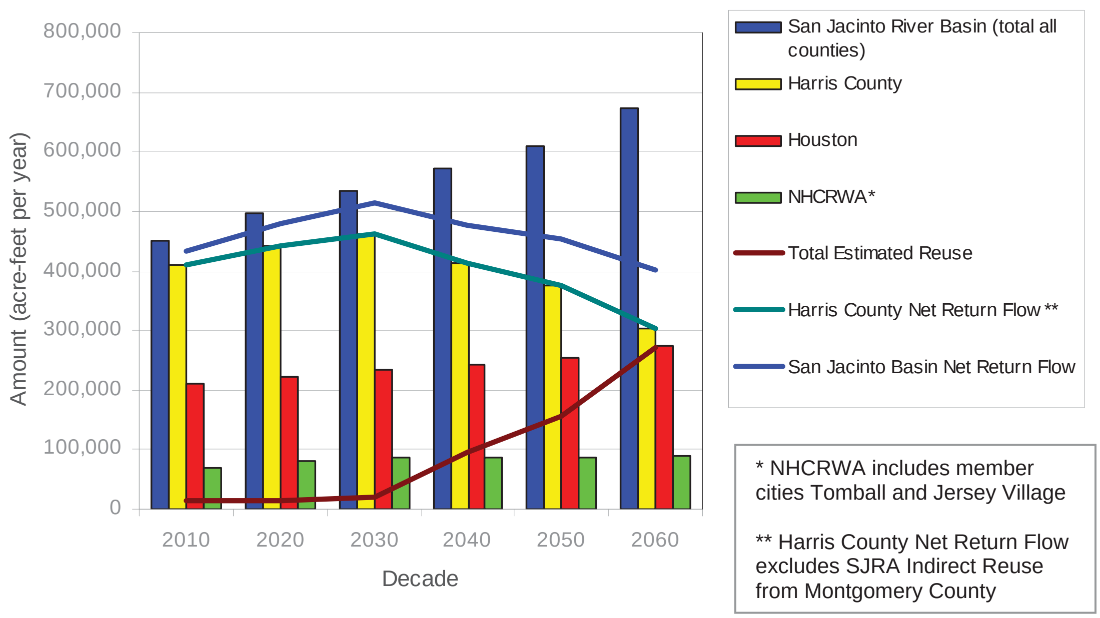
7.1.4 San Jacinto River Basin

The San Jacinto River Basin contains Lakes Houston and Conroe. These reservoirs make up approximately one tenth of the total surface water available in the region. This plan recommends fully utilizing the yield of these reservoirs and other surface water rights within the San Jacinto Basin. In addition, the plan calls for the interbasin transfer of supply from the Trinity River to meet projected demands. Full use of the existing water rights will reduce stream flows during drought conditions. However, this will be mitigated by increased return flows and return flows from imported supply.

Wastewater reuse is a recommended water management strategy in Harris County. An estimate of municipal return flows throughout the planning period is shown in *Figure 7-1*, below, and detailed in *Appendix 7D*. Wastewater Reuse for Industry is recommended to begin by year 2060. The impact of initially diverting this reuse supply may be mitigated by tidal effects in the stream segment where the water is currently discharged. The brine produced by the additional treatment process will be discharged into the Houston Ship Channel, impacting the salinity in the brackish zone. Further investigation will be required to determine the full environmental impacts of the brine discharge. Reuse projects associated with local Groundwater Reduction Plans (GRPs) are expected to begin as early as 2010. Municipal Non-potable Reuse is recommended by 2030. Houston and NHCRWA Indirect Wastewater Reuse strategies are recommended to begin as early as year 2040. Municipal water demand in Harris County is expected to almost double during the planning period, and the recommended reuse volume from the San Jacinto Basin is projected to be approximately 40% of the potential available municipal discharge. This indirect reuse is not expected to be implemented all at once, but rather as a series of small projects over several decades. Therefore, no shock effect of a new large diversion will be realized, and return flows in the San Jacinto Basin will remain near the year 2010 levels.

Figure 7-1

Estimated Municipal Return Flows and Reuse



The groundwater supply source in the San Jacinto Basin is the Gulf Coast Aquifer. The current regional water plan reflects using but not exceeding the sustainable yield of the aquifer in this basin. In Harris County, the Harris-Galveston Subsidence District regulations further restrict the use of groundwater to address land subsidence. These groundwater pumpage restrictions are reflected in the plan.

7.1.5 San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos Coastal Basin encompasses all of Galveston County, most of Brazoria County, and portions of Harris and Fort Bend Counties. The coastal basin contains numerous streams and bayous which flow into Galveston Bay and West Bay. Major bayous contributing to Galveston Bay include Clear Creek, Dickinson Bayou and Chocolate Bayou. Bastrop Bayou, located at the western edge of the basin, flows into Christmas Bay. There are numerous surface water rights for irrigation, mining and manufacturing within the basin and these uses are expected to continue throughout the planning period. Water from the Brazos River is transferred into the coastal basin to meet current demands. The Gulf Coast Water Authority (GCWA) maintains and operates canals and off-channel reservoirs within the coastal basin.

This plan recommends increasing the transfer of water from the Brazos to meet the projected growth in demands of Brazoria and Galveston Counties, which will increase the return flows to Galveston Bay. The GCWA Off-channel Reservoir, which would be located in Brazoria County, is a recommended strategy, and would store water from the existing GCWA canal systems. The reservoir will not require a new water right permit and will add efficiency to the GCWA canal system. The project would likely have a minimal impact on seasonal low flows in the Brazos River, since diversions from the Brazos would be limited by existing permits. The Fort Bend County Off-channel Reservoir and the Brazoria County Off-channel Reservoir are recommended to meet demands in Brazoria, Fort Bend and Galveston counties beginning in 2030. The projects would divert peak flows reducing the net flow through the basin but will have limited impact on seasonal low flows.

Finally, seawater desalination is included as a recommended strategy to meet manufacturing demands in Brazoria County. This strategy will meet a portion of the demands and will potentially increase stream flows, since the return flows from desalination are not associated with a diversion from the source streams. No other surface water impacts are foreseen.

The groundwater supply source in the San Jacinto Basin is the Gulf Coast Aquifer. The plan reflects using, but not exceeding the sustainable yield of the aquifer in this basin. In Fort Bend, Galveston and Harris Counties, regulations enacted by the Fort Bend Subsidence District and the Harris-Galveston Subsidence District further restrict the use of groundwater to address land subsidence. These groundwater pumpage regulations are reflected in the plan.

7.1.6 Brazos River Basin

The Brazos River Basin is the second largest basin in the state (after the Rio Grande), primarily serving Regions O, G and H. The Brazos River Authority operates a system of reservoirs within the middle and upper basin, which provide a portion of the lower basin supply. There are also numerous water rights on the Brazos River and its tributaries which provide water for municipal, manufacturing, irrigation, mining and steam electric power uses. This plan recommends full use of the existing water rights in the lower basin as well as developing new sources of supply.

The Brazos River Authority has identified additional yield that can be realized by operating their reservoirs as a system. This strategy would allow the Brazos River Authority to divert interruptible flows to meet customer needs when these flows are available in lieu of releasing water from reservoir storage. During drought periods, more stored water would then be available, thus increasing the total yield of the Brazos River Authority system. This WMS will reduce the peak flows in the lower Brazos due to the increase in diversions. However, when base flows are below the median value, the BRA would release flows to meet customer demands. This would result in increased flows in the river segments above the customer diversion points, and should have no effect below those diversions.

Four new off-channel reservoirs are included in the 2011 Plan as recommended water management strategies. The recommended strategies include Allens Creek, located in Austin County, the Brazoria County Off-channel Reservoir, the Fort Bend County Off-channel Reservoir and the Dow Off-channel Reservoir. The Dow Off-channel Reservoir will store water diverted using Dow Chemical's existing water rights and will be used to meet manufacturing demands in Brazoria County. The three remaining off-channel reservoirs will divert peak flows in the Brazos Basin. The Little River Off-channel Reservoir, located in Milam County, would divert flows from the Little River in the Brazos Basin. This off-channel reservoir is an alternative strategy in the 2011 RWP. The Little River Off-channel Reservoir would divert peak flows when the source stream is above a set base flow. This will reduce the net flow within the basin, but the impacts during drought or seasonal low flow periods would be limited.

As discussed in the San Jacinto-Brazos coastal basin description above, seawater desalination is included in the plan as a recommended strategy in Brazoria County. This would meet a portion of the manufacturing demands within the lower basin, and may be expanded in the future to meet increased demands. The increase in return flows from this source will mitigate, but not remedy, the reduction in base flows due to full use of water rights in the basin.

To protect water quality in the lower Brazos Basin, particularly at the diversion points serving the southwestern portion of Brazoria County, the construction of a saltwater barrier is recommended.

The Brazos River is the only river basin in Region H not protected from the seasonal tidal influence of saltwater by a saltwater barrier or other impoundment structure. Basin salinity modeling performed by the TWDB has shown that the saltwater influence will move farther upstream under full use of water rights. This project will mitigate that effect and still allow flows to pass into the small Brazos River estuary.

Groundwater within this basin predominantly comes from the Gulf Coast Aquifer, as well as the Carrizo-Wilcox, the Brazos Alluvium, the Sparta and the Queen City Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast and Brazos Alluvium Aquifers in this area. The Carrizo-Wilcox, the Sparta and the Queen City Aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan. In Fort Bend County, regulations enacted by the Fort Bend Subsidence District further restrict the use of groundwater from the Gulf Coast Aquifer to address land subsidence. These regulations are reflected in the plan.

7.1.7 Brazos-Colorado Coastal Basin

The Brazos-Colorado Coastal Basin contains the San Bernard River and its tributary streams. There are several surface water rights along the San Bernard River for manufacturing and irrigation uses. Both of these uses are expected to continue. However, there is a surplus in manufacturing water available. This plan recommends allocating a portion of the manufacturing surplus to meet the mining demand within the coastal basin. The remaining surplus of manufacturing water will remain with the water right holder. Municipal demands are supplied surface water from the Brazos River. No net change to basin flows is expected.

The groundwater supply source in San Jacinto Basin is the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

7.2 Agricultural Resources within Region H

Region H has approximately 4,000,000 acres of land in farms, with about one third of that land in production during any given year. Although this has remained constant over the past two decades, the crops and water usage within those farms has changed. Sugar Land is no longer surrounded by its namesake cane fields, and the Imperial Sugar Mill in that city closed its doors in 2004.

Data from the USDA Census of Agriculture is provided in *Appendix 7A*. The data shows that since 1987, irrigated acreage within Region H has declined by 45%. This decline is driven by economic factors, but the cost of water is among them. Rice, which is the most water-intensive crop raised in the region, has declined in price in recent years. Therefore, the rice price reduction has driven the reduction in irrigation. A rise in price could easily halt the decline in the irrigation demand.

Additionally, the region has approximately 1.55 million acres of productive timberland. This has declined by approximately 36,000 acres over the past decade. Rural land data obtained from the Texas Cooperative Extension at Texas A&M University is also provided in *Appendix 7A*. It indicates that rural land use is increasing in the northern portion of the region, while decreasing in Montgomery and the southern counties due to urbanization. In many counties, native rangeland is being converted to improved, non-irrigated pasture.

This plan holds the projected irrigation demand fairly constant over the planning period, declining from 450,175 acre-feet per year in 2010 to 430,930 acre-feet per year in 2060 (a change of under 5 percent, and consistent with the observed development patterns in the southern half of the region). Region H is able to meet those demands from a combination of existing supplies, and recommended interruptible supplies from existing sources, conservation, Allens Creek Reservoir and off-channel reservoir projects in Fort Bend and Brazoria counties. The need for financial assistance to realize the conservation goal is addressed in *Chapter 8* under legislative recommendations. Providing interruptible water is expected to preserve local agricultural resources by providing irrigators with water at a cheaper rate when surface water supplies are available. Many irrigators in Region H, specifically those in Brazoria County, contract water on a year-to-year basis. The water provided under these contracts is generally less expensive than contracts for firm water supplies. To reflect the economics of irrigation water supplies in Brazoria County, an interruptible water supply strategy was developed to meet irrigation demands that typically contract irrigation water on a year-to-year basis.

7.3 Natural Resources within Region H

Region H contains many natural resources, and the WMS recommended in this plan are intended to protect those resources while still meeting the projected water needs of the region. The impacts of recommended strategies on specific resources are discussed below.

7.3.1 Threatened and Endangered Species

Region H has abundant habitat areas within the Sam Houston National Forest, the Big Thicket Nature Preserve, several National Wildlife Refuges, and significant undeveloped areas. Numerous native and migratory species live within these habitats, including over ten threatened and endangered aquatic species (listed in *Appendix 7B*).

The water management strategies (WMS) recommended in this water plan will have some impacts upon wetlands habitats. In the 2006 Region H Water Plan, two reservoir projects were recommended. The Little River Off-channel Reservoir, located within the Little River watershed, and Allens Creek Reservoir, both with the potential to impact wetlands habitat. However, the potential impacts at these proposed sites are less than on the main stem of a river. In the current plan, the Fort Bend and Brazoria Off-channel Reservoirs have replaced the Little River Off-channel Reservoir to increase the future surface water supply in the Brazos. The Little River Off-channel Reservoir is still included in the plan as an alternative strategy. At the Allens Creek site in Austin County, habitats for the White-faced Ibis, Wood Stork and Houston Toad may be inundated and require mitigation. It should be pointed out that the Allens Creek project was modified by the project sponsor to avoid impacting Alligator Hole, a wetland segment adjacent to the project site. The current plan includes the Allens Creek Reservoir as a recommended water management strategy. Although the Brazoria and Fort Bend Off-channel reservoir sites have not been defined, it is anticipated that these strategies may inundate wetland and endangered species habitats requiring mitigation.

The transfer of supply from Lake Livingston into the San Jacinto Basin is recommended in this plan. While the recommended amount is less than the full yield of the reservoir, it will still impact the lake level during dry periods as well as wetlands along the periphery of the reservoir. Habitats for the Wood Stork and Alligator Snapping Turtle may be affected during drought periods, but no permanent impacts to these habitats are foreseen.

The recommended conveyance from the Trinity to the San Jacinto Basin is the Luce Bayou Transfer. This project includes a pump station, pipeline, 23.6 miles of canal and an outfall into Lake Houston. The current alignment will disturb undeveloped forest areas near the Trinity River, farm lands, and more developed areas near Lake Houston. By limiting the use of bed and banks conveyance, the current Luce Bayou strategy attempts to minimize impacts on wetlands and avoid them wherever possible.

Texas Parks and Wildlife Department Resource Protection Division prepared an evaluation of the WMS considered in the 2001 Region H Plan. That assessment, which is the most recent available, addresses terrestrial species as well as the aquatic species addressed above, and is included as *Appendix 7C*.

7.3.2 Parks and Public Lands

As described in *Chapter 1*, Region H contains over 325,000 acres of state and national forests, over 107,000 acres of coastal wildlife refuges, and over 12,000 acres of Texas wildlife management areas. The RHWPG was fortunate that none of the recommended strategies required water supply projects within or conveyances through these areas. The transfer of supply from Lake Livingston into the San Jacinto basin has the potential to reduce flows through the Trinity River National Wildlife Refuge during drought periods. The transfer may also include an interbasin pipeline route potentially impacting lands in the Sam Houston National Forest (SHNF) increasing possible environmental impacts from construction and maintenance activities.

7.3.3 Impacts of Water Management Strategies on Unique Stream Segments

Region H recommended eight stream segments for designation as unique in the 2006 Water Plan. The streams recommended were:

- Armand Bayou in Harris County
- Austin Bayou in Brazoria County
- Bastrop Bayou in Brazoria County
- Big Creek in Fort Bend County
- Big Creek in San Jacinto County
- Cedar Lake Creek in Brazoria County
- Menard Creek in Polk and Liberty Counties
- Oyster Bayou in Chambers County

All of these segments occur within riparian conservation areas, and there are no water management strategies that divert additional water from or above these streams. Additionally, terrestrial strategies such as brush control or salt cedar removal are not recommended within Region H, so the riparian habitats should not be affected. Finally, there is some concern that overuse of groundwater would impact spring flows within the Sam Houston National Forest. Region H does not recommend the export of groundwater from any county, and encourages the formation of groundwater conservation districts to actively manage these resources. The western portion of the National Forest lies in Walker and Montgomery Counties, which both have active groundwater conservation districts. The southern portion of the National Forest is in San Jacinto and Liberty Counties, which are currently working towards forming a groundwater conservation district.

The current unique stream segments and an analysis of all proposed stream segments is provided in *Chapter 8*.

7.3.4 Impacts of Water Management Strategies on Galveston Bay

The Galveston Bay estuary is arguably the most significant natural resource within Region H, providing habitat for a rich diversity of permanent and migratory species, recreational and tourism use, employment for fisherman and the tourism industry, and serves as the gateway to the second busiest port in the U.S.

As discussed in *Chapter 4*, Galveston Bay is affected by the water plans for both Region C (in the Upper Trinity River Basin) and for Region H (in the Lower Trinity and San Jacinto River Basins. The Galveston Bay Freshwater Inflows Group has defined target frequencies for inflows to the estuary, based upon salinity and harvest models developed by the TCEQ and TPWD. In 2008, the Region H

Planning Group authorized a study to analyze the impact of individual strategies on Bay and Estuary (B&E) inflows from individual water management strategies. The study analyzed the impacts on inflows to Galveston Bay and instream flows to identify the impacts from future strategies. The effects of the 2006 Regional Water Plans on the Bay are summarized in *Table 7-1*below. While the table indicates that the combined plans will maintain overall flows into Galveston Bay, it does not reflect the change in inflow locations. The transfer of water from the Trinity River Basin into the San Jacinto basin will relocate return flows from Trinity Bay to Upper Galveston Bay. This may have some impact on the oyster beds located within Trinity Bay. The increase of flows into Upper Galveston Bay should be less of a concern, because that flow will occur in the Houston Ship Channel (a dredged channel that is significantly deeper than the rest of the estuary). As a continuation of the environmental flows investigation performed in 2008, the impact of water management strategies on bay and estuary inflows was analyzed on a decadal basis. The decadal environmental flows investigation is presented in *Chapter 4*.

Table 7-1

Overall Frequencies of Meeting Monthly Inflow Targets

Inflow Target	Max H	Min Q	Min Q-Sal
Historical Frequency	66%	78%	82%
GBFIG Target Frequency	50%	60%	75%
Naturalized Flow	68%	67%	83%
Existing Diversions with Full Return Flows	63%	58%	79%
Full Authorized Diversions with Return Flows	59%	53%	75%
Full Authorized Diversions with no Return Flows	43%	43%	56%
Future 2060 Conditions with Return Flows and all Recommended WMS	62%	59%	77%

7.3.5 Energy Reserves

Oil, gas and other energy reserves are considered natural resources of the state. While Region H is home to a large portion of the nation's petrochemical industry, the amount of actual oil and gas mining within Region H is small compared to other portions of the state. In this plan, Region H was able to identify reliable supplies to meet all projected mining and manufacturing demands throughout the planning period. No adverse affect on this resource is foreseen.

Appendix 7A

Agricultural Census Data
1987 - 2007

This Page Intentionally
Left Blank

Agricultural Census Data

The Data presented on the following tables was obtained from the U.S. Department of Agriculture, National Agricultural Statistics Service.

This Page Intentionally Left Blank

Appendix 7A
Agricultural Census Data

Table 7A-1 Land in Farms (acres)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	347,215	337,351	367,432	367,497	333,928	-3.83%
Brazoria	537,077	563,993	566,809	613,891	528,957	-1.51%
Chambers	306,606	251,249	241,933	274,853	267,343	-12.81%
Fort Bend	363,823	422,464	431,582	415,251	382,740	5.20%
Galveston	98,924	102,229	104,941	127,280	103,387	4.51%
Harris	374,759	308,344	311,005	304,868	259,039	-30.88%
Leon	499,334	482,165	514,724	562,615	569,101	13.97%
Liberty	362,794	342,213	306,783	304,574	297,855	-17.90%
Madison	222,574	243,989	223,690	244,524	273,109	22.70%
Montgomery	188,284	193,885	193,375	197,892	169,914	-9.76%
Polk	144,390	141,215	135,988	129,956	131,664	-8.81%
San Jacinto	91,209	82,721	84,620	93,497	95,492	4.70%
Trinity	133,122	109,635	98,748	104,724	108,974	-18.14%
Walker	269,832	213,923	183,988	206,311	224,050	-16.97%
Waller	276,750	242,901	238,110	277,000	271,004	-2.08%
Region H	4,216,693	4,038,277	4,003,728	4,224,733	4,016,557	-4.75%

Table 7A-2 Total Cropland (acres)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	155,357	161,996	161,192	134,793	96,559	-37.85%
Brazoria	195,681	221,812	203,341	224,640	186,201	-4.84%
Chambers	109,707	120,193	118,316	134,492	115,588	5.36%
Fort Bend	162,516	191,148	193,138	194,001	152,112	-6.40%
Galveston	38,242	38,543	30,285	45,773	21,819	-42.94%
Harris	162,421	142,216	118,827	124,340	91,438	-43.70%
Leon	144,407	175,179	182,633	184,627	121,142	-16.11%
Liberty	183,670	163,630	159,841	156,413	127,704	-30.47%
Madison	72,388	84,345	79,105	91,864	39,646	-45.23%
Montgomery	43,583	49,621	47,711	57,776	33,782	-22.49%
Polk	37,013	37,294	42,208	44,673	23,720	-35.91%
San Jacinto	20,252	24,432	28,355	35,427	21,027	3.83%
Trinity	46,740	54,531	49,188	42,771	27,340	-41.51%
Walker	56,318	59,530	60,192	61,715	37,146	-34.04%
Waller	121,223	118,632	116,477	124,431	103,518	-14.61%
Region H	1,549,518	1,643,102	1,590,809	1,657,736	1,198,742	-22.64%

Table 7A-3 Irrigated Land (acres)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	3,026	3,781	4,954	3,541	1,559	-48.48%
Brazoria	33,271	38,682	29,596	17,138	11,980	-63.99%
Chambers	24,748	32,127	24,894	16,152	11,508	-53.50%
Fort Bend	13,291	16,415	17,039	15,751	8,339	-37.26%
Galveston	4,713	3,120	1,449	1,703	614	-86.97%
Harris	13,630	15,749	10,454	7,295	7,037	-48.37%
Leon	492	485	1,667	1,383	2,831	475.41%
Liberty	21,302	29,142	14,092	11,828	5,313	-75.06%
Madison	311	135	208	243	456	46.62%
Montgomery	163	406	474	1,287	2,262	1287.73%
Polk	121	36	377	99	1,440	1090.08%
San Jacinto	76	132	104	292	943	1140.79%
Trinity	55	14	52	213	310	463.64%
Walker	161	170	325	600	885	449.69%
Waller	5,461	8,187	8,120	11,908	9,904	81.36%
Region H	120,821	148,581	113,805	89,433	65,381	-45.89%

Table 7A-4 Land in Irrigated Farms (acres)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	21,782	26,550	39,537	24,162	12,755	-41.44%
Brazoria	198,605	172,446	157,328	117,411	89,055	-55.16%
Chambers	179,509	132,618	92,798	82,026	58,872	-67.20%
Fort Bend	67,502	65,470	71,369	70,799	60,685	-10.10%
Galveston	20,682	13,121	5,556	9,669	3,213	-84.46%
Harris	72,078	62,473	54,502	37,006	15,395	-78.64%
Leon	7,574	3,848	11,700	9,167	19,257	154.25%
Liberty	148,439	138,307	92,453	50,930	36,442	-75.45%
Madison	6,164	3,388	5,784	2,117	15,449	150.63%
Montgomery	1,451	3,158	1,942	11,239	14,485	898.28%
Polk	545	144	4,331	1,137	4,492	724.22%
San Jacinto	518	597	973	1,991	2,644	410.42%
Trinity	870	112	240	922	1,411	62.18%
Walker	4,686	2,322	21,121	5,970	26,555	466.69%
Waller	54,443	49,874	40,666	45,540	56,102	3.05%
Region H	784,848	674,428	600,300	470,086	416,812	-46.89%

Table 7A-5 Land in Irrigated Farms, Harvested Cropland (acres)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	4,053	4,425	8,201	5,857	4,398	8.51%
Brazoria	53,866	55,395	42,533	42,074	31,452	-41.61%
Chambers	30,954	35,563	26,550	18,611	11,482	-62.91%
Fort Bend	26,078	26,899	29,735	31,805	17,904	-31.34%
Galveston	6,214	3,421	1,445	1,538	524	-91.57%
Harris	18,996	20,609	12,691	13,837	6,794	-64.23%
Leon	621	507	1,834	1,601	3,633	485.02%
Liberty	52,409	56,736	39,882	30,840	12,485	-76.18%
Madison	1,461	(D)	1,496	571	1,070	-26.76%
Montgomery	229	618	577	1,209	6,374	2683.41%
Polk	147	36	365	230	868	490.48%
San Jacinto	96	157	131	315	1,194	1143.75%
Trinity	75	22	51	241	250	233.33%
Walker	190	108	(D)	802	4,107	2061.58%
Waller	11,009	17,854	13,835	15,388	13,399	21.71%
Region H	206,398	222,350	179,326	164,919	115,934	-43.83%

Table 7A-6 Rice (hundredweight)

	1987	1992	1997	2002	2007	% Change (1987 - 2007)
Austin	159,111	207,445	175,843	130,601	0	-100.00%
Brazoria	1,535,740	1,713,898	1,134,188	1,013,213	572,285	-62.74%
Chambers	1,070,528	1,276,063	949,505	713,173	639,692	-40.25%
Fort Bend	575,994	676,342	658,485	803,346	278,716	-51.61%
Galveston	221,713	127,871	51,563	75,527	(D)	N/A
Harris	564,625	584,225	356,432	107,876	62,265	-88.97%
Leon	0	0	0	0	0	N/A
Liberty	983,301	1,267,760	604,582	464,751	193,188	-80.35%
Madison	0	0	0	0	0	N/A
Montgomery	0	0	0	0	0	N/A
Polk	0	0	0	0	0	N/A
San Jacinto	0	0	0	0	0	N/A
Trinity	0	0	0	0	0	N/A
Walker	0	0	0	0	0	N/A
Waller	285,531	413,337	468,471	679,960	581,785	103.76%
Region H	5,396,543	6,266,941	4,399,069	3,988,447	2,327,931	-56.86%

Table 7A-7 Rural Land Use Data (acres)

Austin

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	408,229	403,425	-4,804
Dryland Crop	38,799	31,967	-6,832
Irrigated Crop	5,772	7,069	1,297
Improved Pasture	49,156	100,738	51,582
Native Rangeland	296,906	250,155	-46,751
Other	17,354	12,895	-4,459
Timberland	242	601	359

Brazoria

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	556,123	539,461	-16,662
Dryland Crop	28,873	15,951	-12,922
Irrigated Crop	128,456	113,888	-14,568
Improved Pasture	9,189	36,189	27,000
Native Rangeland	365,001	347,751	-17,250
Other	24,159	25,102	943
Timberland	445	580	135

Chambers

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	273,197	261,713	-11,484
Dryland Crop	13,578	2,573	-11,005
Irrigated Crop	123,057	98,269	-24,788
Improved Pasture	8,635	9,069	434
Native Rangeland	104,669	115,276	10,607
Other	9,489	24,193	14,704
Timberland	13,769	12,333	-1,436

Fort Bend

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	355,487	342,356	-13,131
Dryland Crop	101,106	82,210	-18,896
Irrigated Crop	28,450	32,186	3,736
Improved Pasture	17,570	27,083	9,513
Native Rangeland	205,765	197,004	-8,761
Other	2,518	3,746	1,228
Timberland	78	127	49

Galveston

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	92,147	101,154	9,007
Dryland Crop	224	286	62
Irrigated Crop	33,027	26,804	-6,223
Improved Pasture	7,861	8,293	432
Native Rangeland	50,942	64,593	13,651
Other	93	1,178	1,085
Timberland	0	0	0

Harris

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	185,785	174,053	-11,732
Dryland Crop	21,043	11,379	-9,664
Irrigated Crop	14,193	7,534	-6,659
Improved Pasture	18,750	18,671	-79
Native Rangeland	87,904	80,519	-7,385
Other	5,350	19,822	14,472
Timberland	38,545	36,128	-2,417

Leon

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	648,488	680,099	31,611
Dryland Crop	0	0	0
Irrigated Crop	0	0	0
Improved Pasture	252,522	0	-252,522
Native Rangeland	378,783	530,129	151,346
Other	0	123,892	123,892
Timberland	17,183	26,078	8,895

Liberty

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	598,553	620,610	22,057
Dryland Crop	56,107	56,202	95
Irrigated Crop	52,500	31,146	-21,354
Improved Pasture	44,556	66,827	22,271
Native Rangeland	146,663	146,543	-120
Other	9,151	2,988	-6,163
Timberland	289,576	316,904	27,328

Madison

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	607,484	607,904	420
Dryland Crop	9,811	12,068	2,257
Irrigated Crop	6,979	5,746	-1,233
Improved Pasture	18,831	30,318	11,487
Native Rangeland	268,424	549,798	281,374
Other	303,439	9,974	-293,465
Timberland	0	0	0

Montgomery

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	368,389	330,118	-38,271
Dryland Crop	0	0	0
Irrigated Crop	0	0	0
Improved Pasture	6,264	10,111	3,847
Native Rangeland	89,981	98,227	8,246
Other	157	128	-29
Timberland	271,987	221,652	-50,335

Polk

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	524,757	483,590	-41,167
Dryland Crop	0	0	0
Irrigated Crop	0	0	0
Improved Pasture	48,163	85,309	37,146
Native Rangeland	49,205	3,725	-45,480
Other	247	533	286
Timberland	427,142	394,023	-33,119

San Jacinto

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	195,044	199,223	4,179
Dryland Crop	509	2,056	1,547
Irrigated Crop	33	25	-8
Improved Pasture	26,130	37,753	11,623
Native Rangeland	40,627	38,683	-1,944
Other	284	12	-272
Timberland	127,461	120,694	-6,767

Trinity

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	388,395	391,412	3,017
Dryland Crop	1,288	79	-1,209
Irrigated Crop	0	0	0
Improved Pasture	22,191	20,448	-1,743
Native Rangeland	109,149	100,744	-8,405
Other	25	893	868
Timberland	255,742	269,248	13,506

Walker

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	312,570	320,913	8,343
Dryland Crop	0	0	0
Irrigated Crop	0	0	0
Improved Pasture	22,508	56,278	33,770
Native Rangeland	156,454	122,914	-33,540
Other	0	173	173
Timberland	133,608	141,548	7,940

Waller

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	370,737	367,294	-3,443
Dryland Crop	71,451	66,715	-4,736
Irrigated Crop	37,210	28,855	-8,355
Improved Pasture	53,409	55,035	1,626
Native Rangeland	187,884	197,177	9,293
Other	5,711	5,076	-635
Timberland	15,072	14,436	-636

Region H Total

Landuse Type	Acres in 1992	Acres in 2001	10 year change
All	5,885,385	5,823,325	-62,060
Dryland Crop	342,789	281,486	-61,303
Irrigated Crop	429,677	351,522	-78,155
Improved Pasture	605,735	562,122	-43,613
Native Rangeland	2,538,357	2,843,238	304,881
Other	377,977	230,605	-147,372
Timberland	1,590,850	1,554,352	-36,498

Appendix 7B

Threatened and Endangered Species within Region H

This Page Intentionally
Left Blank

Threatened and Endangered Species within Region H

Listed below are the state- and federally-listed aquatic threatened and endangered aquatic species within Region H, by county. A description of each threatened and endangered species is listed on the following pages.

Species	County														
	Austin County	Brazoria County	Chambers County	Fort Bend County	Galveston County	Harris County	Leon County	Liberty County	Madison County	Montgomery County	Polk County	San Jacinto County	Trinity County	Walker County	Waller County
Alligator Snapping Turtle	X	X	X	X	X	X	X	X	X	X	X	X		X	X
American Peregrine Falcon	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Artic Peregrin Falcon	X	X	X		X	X	X	X	X	X	X	X		X	X
Atlantic Hawksbill Sea Turtle		X	X		X	X									
Bald Eagle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black Rail		X			X	X									
Brown Pelican*		X	X		X	X									
Corkwood		X	X	X											
Correll's false dragon-head					X					X					
Creek Chubsucker								X		X	X	X	X	X	X
Green Sea Turtle		X	X		X	X									
Houston Toad	X					X	X	X	X						
Interior Least Tern	X		X				X		X						X
Kemps Ridley Sea Turtle		X	X		X	X									
Leatherback Sea Turtle		X	X		X	X									
Loggerhead Sea Turtle		X	X		X	X									
Paddlefish							X	X	X	X	X	X	X	X	
Piping Plover		X	X		X			X		X	X		X	X	
Reddish Egret		X	X		X										
Sharpnose shiner		X													X
Swallow-tailed Kite		X	X		X			X			X	X		X	
Timber/Canebrake Rattlesnake			X	X	X	X	X	X		X	X	X		X	X
West Indian manatee		X													
White-faced Ibis	X	X	X	X	X	X		X		X			X		X
Wood Stork	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

* Delisted in November, 2009 by United States Fish and Wildlife Service

Description of Threatened and Endangered Species

Alligator Snapping Turtle (*Macrochelys temminckii*) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October

American Peregrine Falcon *(Falco peregrinus anatum)*- year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Artic Peregrin Falcon *(Falco peregrinus tundrius)*- migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Atlantic Hawksbill Sea Turtle *(Eretmochelys imbricate)-* Gulf and bay system, warm shallow waters especially in rocky marine environments, such as coral reefs and jetties, juveniles found in floating mats of sea plants; feed on sponges, jellyfish, sea urchins, mollusks, and crustaceans, nests April through November

Bald Eagle (*Haliaeetus leucocephalus*) - found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Black Rail (*Laterallus jamaicensis*) - salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous year's dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Corkwood (*Leitneria floridana*) – small, sparingly-branched, dioecious, deciduous shrub or small tree; forms thickets of stick-like erect stems, the diameter of each at base rarely to 12 or 13 cm; found in narrow zone between brackish marsh and contiguous coastal pine-hardwood; brackish or freshwater swamps or thickets; flowers in spring

Correll's false dragon-head (*Physostegia correllii*) – wet soils including roadside ditches and irrigation channels; flowering June-July

Creek Chubsucker (*Erimyzon oblongus*) - small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks

Green Sea Turtle *(Chelonia mydas)* - Gulf and bay system; shallow water seagrass beds, open water between feeding and nesting areas, barrier island beaches; adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds; nesting behavior extends from March to October, with peak activity in May and June

Houston Toad (Bufo houstonensis) - endemic; species sandy substrate, water in pools, ephemeral pools, stock tanks; breeds in spring especially after rains; burrows in soil when inactive; breeds February-June

Interior Least Tern (*Sterna antillarum athalassos*) – this subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Kemps Ridley Sea Turtle *(Lepidochelys kempii)-* Gulf and bay system, adults stay within the shallow waters of the Gulf of Mexico; feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August

Leatherback Sea Turtle *(Dermochelys coriacea)*- Gulf and bay systems, and wide-ranging open water sea turtle; omnivorous, shows a preference for jellyfish; nests from November to February, but not known to nest in Gulf of Mexico, just forages

Loggerhead Sea Turtle *(Caretta caretta)-* Gulf and bay system primarily for juveniles, adults are most pelagic of the sea turtles; omnivorous, shows a preference for mollusks, crustaceans, and coral; nests from April through November

Paddlefish (*Polyodon spathula*) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir

Piping Plover *(Charadrius melodus)* - wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats

Reddish Egret *(Egretta rufescens) -* resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear

Sharpnose shiner *(Notropis Oxyrhynchus)*- endemic to Brazos River drainage; also, apparently introduced into adjacent Colorado River drainage; large turbid river, with bottom a combination of sand, gravel, and clay-mud

Swallow-tailed Kite (*Elanoides forficatus*) - lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees

Timber/Canebrake Rattlesnake *(Crotalus horridus)-* swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto

West Indian manatee *(Trichechus manatus)-* Gulf and bay system; opportunistic, aquatic herbivore

White-faced Ibis (*Plegadis chihi*) - prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats

Wood Stork (*Mycteria americana*) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960

This Page

Intentionally Left Blank

Appendix 7C

Texas Parks and Wildlife Department Analysis of Water Management Strategies Recommended in the 2001 Region H Water Plan

This Page Intentionally
Left Blank

Texas Parks and Wildlife Department

Analysis of Water Management Strategies

Recommended in the 2001 Region H Water Plan

The Resource Protection Division of the Texas Parks and Wildlife Department prepared the attached document: Region H Strategies – Preliminary Assessment, Internal Working Memorandum, 2001.

The following changes between the 2001 Region H Plan and this update to the plan should be noted:

- The final impoundment plan for Allens Creek Reservoir, as submitted and approved in the water right application, was changed from the outline included in the 2001 Region H Water Plan. The project footprint was reduced to avoid Alligator Hole.

- Bedias Creek Reservoir and the related Interbasin Transfer from Bedias to Lake Conroe is not a recommended strategy in the 2006 Plan or the 2011 update to the Region H plan.

- Little River Reservoir has been replaced in the 2006 update to the Region H Plan with an off-channel reservoir in the Little River Basin. The Little River Off-channel Reservoir was replaced in the 2011 update to the Region H Plan with the Millican Lake/Reservoir on the Navasota River. The Little River Off-Channel Reservoir is included in the 2011 Plan as an Alternative Water Management Strategy.

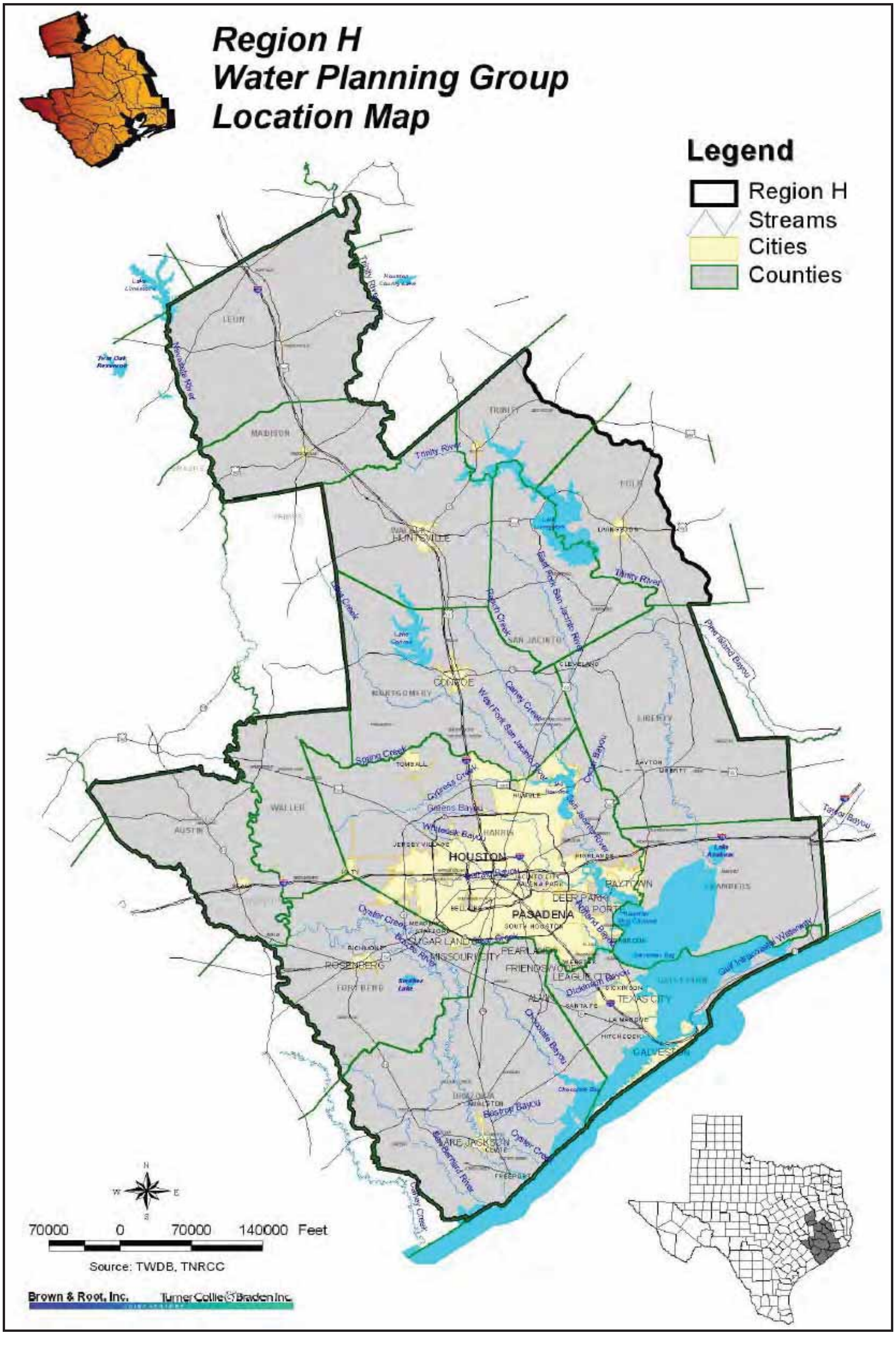
- The SJRA/Lake Livingston Diversion was not a recommended strategy in the 2001 and 2006 Region H Plan, nor is it recommended in the 2011 update.

- The Sabine to Region H Interbasin Transfer was not a recommended strategy in the 2001 and 2006 Region H Plan, nor is it recommended in the 2011 update. It is however, listed as an alternative strategy.

- The COH/GCWA transfer strategy was recommended in the 2006 Region H Water Plan, but is not included in the 2011 Plan Update as a recommended or alternative water management strategy.

This Page
Intentionally Left Blank

Texas Parks and Wildlife Department
Region H Strategies – Preliminary Assessment
Internal Working Memorandum
2001


Region H
Water Planning Group
Location Map
Legend
Region H
Streams
Cities
Counties
HOUSTON
PASADENA
BAYTOWN
DEER PARK
HUNTSVILLE
CONROE
CLEVELAND
LIBERTY
SAN JACINTO
MADISON
LEON
TRINITY
POLK
MONTGOMERY
WALLER
AUSTIN
HARRIS
CHAMBERS
GALVESTON
TEXAS CITY
LEAGUE CITY
FRIENDSWOOD
PEARLAND
MISSOURI CITY
SUGAR LAND
ROSENBERG
FORT BEND
LAKE JACKSON
Trinity River
Greens Bayou
Cypress Creek
Oyster Creek
Dickinson Bayou
Chocolate Bayou
Bastrop Bayou
Gulf Intracoastal Waterway
70000 0 70000 140000 Feet
Source: TWDB, TNRCC
Brown & Root, Inc.
Turner Collie & Braden Inc.

Region H		Houston RWPG	
Proposed Project / Strategy	**acre/feet**	**Concerns/Potential Impacts**	**Date Needed**
Allens Creek Reservoir (BRA/Houston)	99,650/yr	Loss/alteration of habitat to inundation (8,250 acres); Reduced instream flows and freshwater inflows; Pipeline construction from reservoir (bed and banks, wetlands, terrestrial habitat, rare species)	Now
Bedias Creek Reservoir (SJRA/TRA)	90,700/yr	Loss/alteration of habitat to inundation ; Reduced instream flows; Pipeline construction from reservoir (bed and banks, wetlands, terrestrial habitat, rare species)	2030
Little River Reservoir (BRA/GCWA)	129,000/yr	Loss/alteration of habitat to inundation; Reduced instream flows; Pipeline construction from reservoir (bed and banks, wetlands, terrestrial habitat, rare species)	????
Luce Bayou transfer (City of Houston)	75,000/yr	8 miles of rectification; Reduced flows in Trinity River; Reduced freshwater inflows to Trinity Bay; Increased flows in Luce Bayou; Loss/alteration of habitat	2020
SJRA/City of Houston contract	67,029/yr	Reduced instream flows between Conroe and Lake Houston; Alteration/loss of habitat; Pipeline construction?	2030
SJRA/Lake Livingston Diversion	75,000/yr	Rectification of stream channel and increased flows in San Jacinto River; Reduced instream flows downstream of Lake Livingston; Reduced freshwater inflows to Trinity Bay; Pipeline construction?	2030
TRA/City of Houston contract	200,000/yr	CWA canal or Luce Bayou	2040
Bedias transfer	90,700/yr	Rectification of and increased flows in Mock Branch and West Fork San Jacinto River; Pipeline construction (bed and banks, wetlands)	2030
GCWA/City of Houston contract (Trinity River water to Galveston)	23,000/yr	Reduced freshwater inflows to Trinity Bay; Pipeline construction (bed and banks, wetlands, rare species)	2050
Sabine transfer for all water user groups	101,500 - 453,100/yr	Interbasin transfer; Pipeline construction (bed and banks, wetlands, loss of habitat, rare species, cultural resources); movement of exotic species or species not native to receiving basin	2010-2050

STRATEGY: Allens Creek Reservoir

SPONSOR: Brazos River Authority, City of Houston

SUMMARY

DESCRIPTION: The reservoir site is located on Allens Creek, a tributary to the Brazos River, in Austin County. A permit has been issued for this project to the TWDB for industrial purposes for the consumptive use of 46,256 acre-feet per year. The Brazos Rivber Authority (BRA) and the City of Houston (COH) have recently submitted a permit amendment to increase the project yield, change the use type and become project sponsors. The BRA is in the process of purchasing the entire site from Reliant Energy (this may have already been accomplished). The project is configured as a scalping reservoir that would divert stormwater flows from the Brazos River and impound these flows into the reservoir to create storage yield. Maximum dam height is 53 feet and the conservation storage capacity is approximately 145,500 acre-feet at an elevation of 121.0 feet msl.

COST: $157.3 million (1999)

STARTING DECADE: 2000

QUANTITY OF WATER: 99,650 acre-feet per year

LAND IMPACTED: 7,000 acres (Region H Plan, 2001); 8,250 acres (Bauer et al, 1991)

PURPOSE: Municipal, Industrial, and Irrigation Water Supply and Recreation

ISSUES AFFECTING FEASIBILITY: The Texas Legislature has designated this site as a Unique Reservoir Site. The Water Planning Group rated environmental impacts moderate to small and also reported no endangered species have been found on the site. TPWD's Wildlife Diversity Program reports the following rare species may be found in Austin County:

Houston Toad (State and Federally Endangered)
American Peregrine Falcon (State Endangered/Federally Delisted)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Attwater's Greater Prairie Chicken (State and Federally Endangered)
Bald Eagle (State and Federally Threatened)
Henslow's Sparrow (State Species of Concern)
Mountain Plover (State Species of Concern)
White-faced Ibis (Federal Species of Concern/State Threatened)
White-tailed Hawk (Federal Species of Concern/State Threatened)
Whooping Crane (State and Federally Endangered)
Wood Stork (Federal Species of Concern/State Threatened)
Plains Spotted Skunk (State Species of Concern)

Smooth Green Snake (Federal Species of Concern/State Threatened)
Texas Garter Snake (State Species of Concern)
Texas Horned Lizard (Federal Species of Concern/State Threatened)
Timber/Canebrake Rattlesnake (Federal Species of Concern/State Threatened)

Diversion of floodflows from the Brazos River will result in the reduction/alteration of instream flows and freshwater inflows to the Gulf of Mexico. There is a USGS gage on the Brazos River upstream of the project location near the City of Hempstead (USGS gage # 08111500) and another gage downstream near the City of Richmond (USGS gage # 08114000). At times, flows in the Brazos River in the project area are affected by reservoirs on the Brazos River at Waco and by reservoirs on the Lampasas and Little Rivers above Cameron. Median monthly flows (cfs), minimum flows (cfs), and maximum flows (cfs) from the aforementioned gages are presented below:

Monthly median flows (cfs) as reported from USGS gage # 08111500 near Hempstead, TX for the Period of Record (1938 to current year):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2840	3790	3370	3840	7400	5500	2190	1430	1440	1450	1670	2380

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
386	483	425	922	953	1027	817	714	453	180	318	299

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
55994	54748	50455	42857	69861	51960	18998	11507	18028	24832	29487	41594

Monthly median flows (cfs) as reported from USGS gage # 08114000 near Richmond, TX for the Period of Record (1922 to current year):

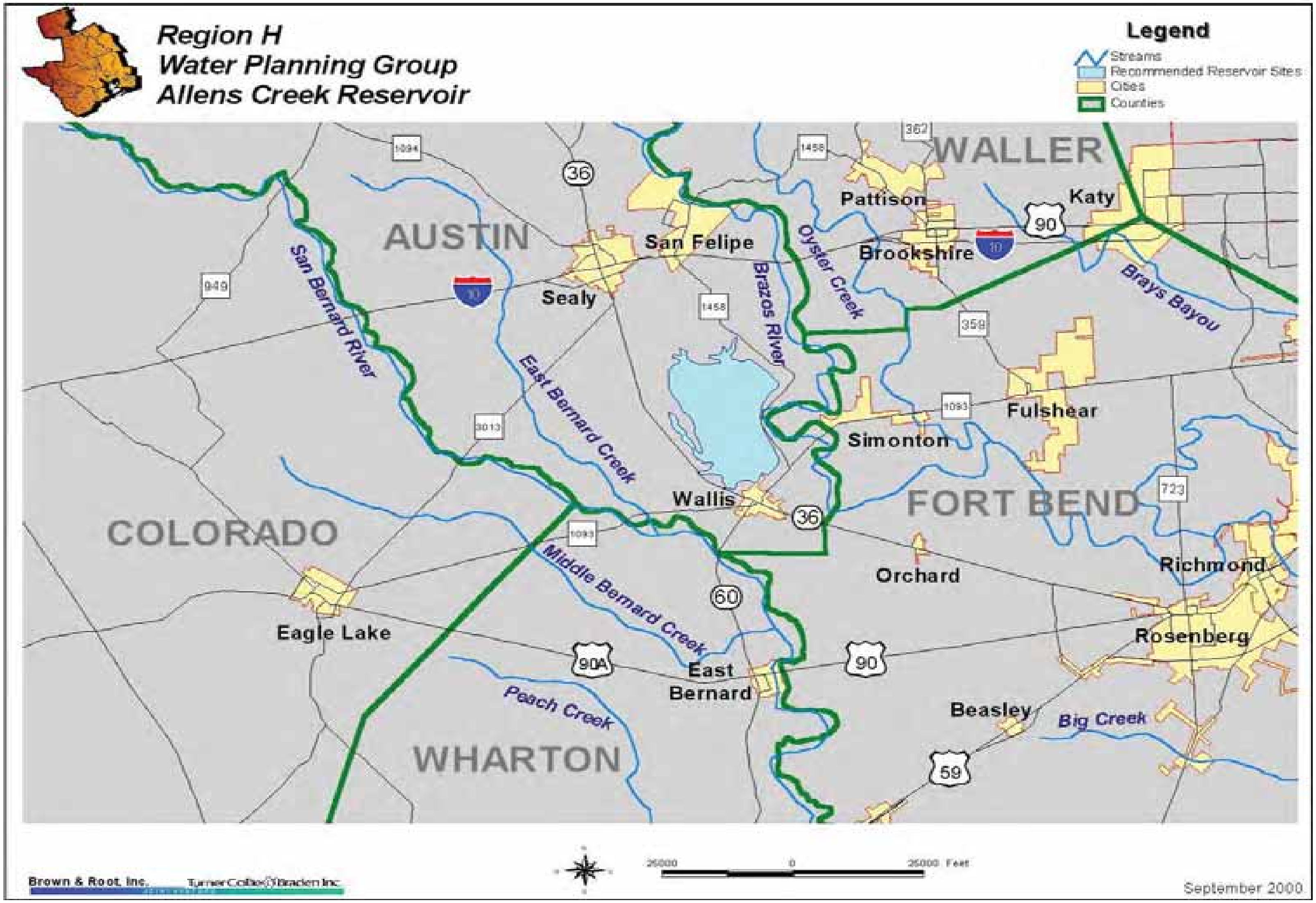
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3540	4600	4400	4300	7310	5900	2360	1440	1570	1700	2000	2595

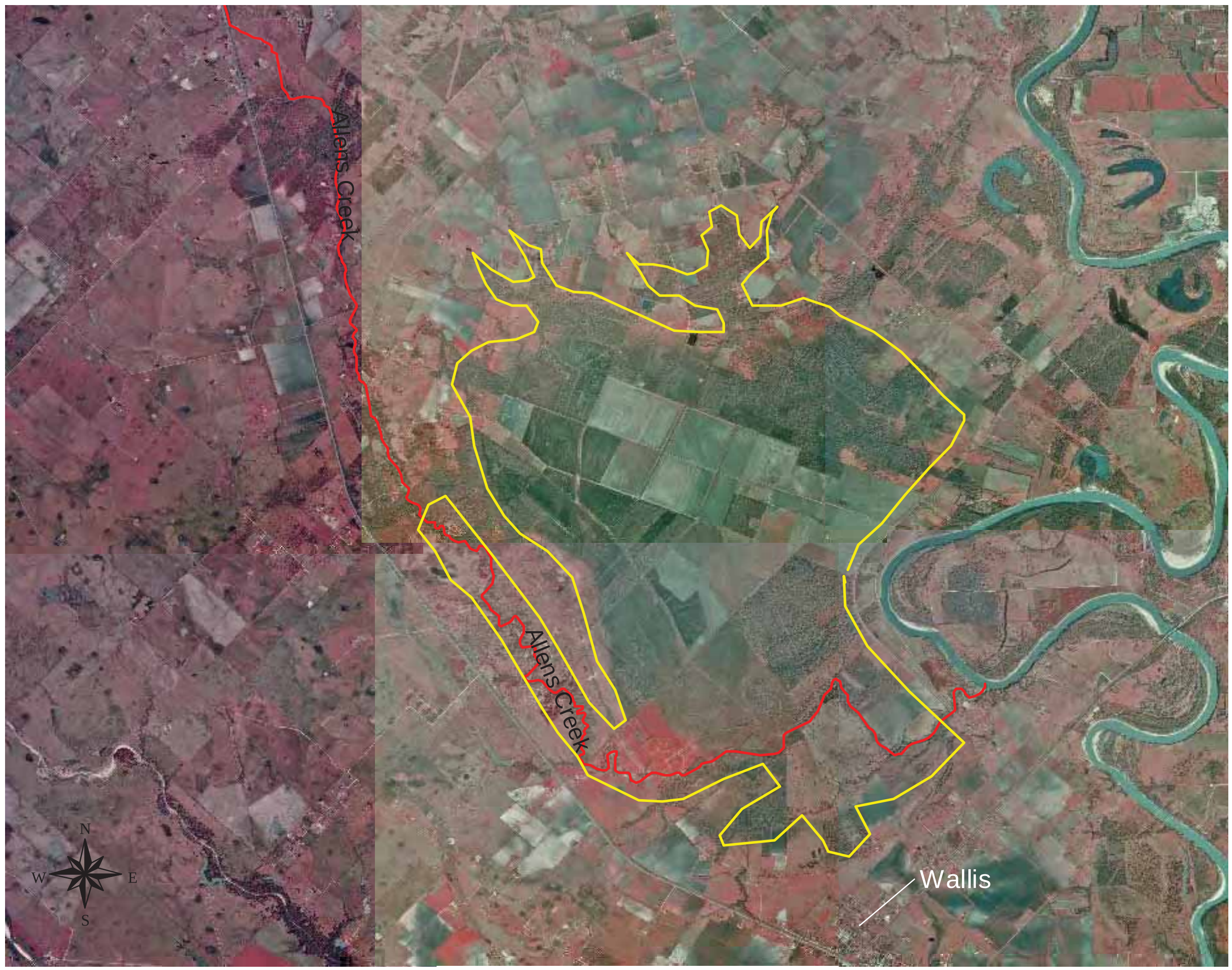
Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
542	527	445	453	818	603	221	141	414	202	366	479

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
60497	54407	54052	41900	77197	58350	21261	11802	19847	28763	32360	52865


Region H
Water Planning Group
Allens Creek Reservoir
Legend
Streams
Recommended Reservoir Sites
Cities
Counties
WALLER
AUSTIN
COLORADO
WHARTON
FORT BEND
Katy
Pattison
Brookshire
San Felipe
Sealy
Simonton
Fulshear
Wallis
Orchard
Richmond
Rosenberg
Eagle Lake
East
Bernard
Beasley
San Bernard River
East Bernard Creek
Brazos River
Oyster Creek
Brays Bayou
Middle Bernard Creek
Peach Creek
Big Creek
36
90
90A
60
59
1094
949
1458
362
359
1093
3013
723
25000
0
25000 Feet
Brown & Root, Inc.
Turner Collie & Braden Inc.
September 2000


Allens Creek
Allens Creek
Wallis
N
E
S
W

STRATEGY: Bedias Creek Reservoir

SPONSOR: San Jacinto River Authority, Trinity River Authority

<u>SUMMARY</u>

DESCRIPTION: The reservoir site is located principally within Madison County in the Trinity River Basin and includes Bedias and Caney Creeks. The upstream drainage area is approximately 395 square miles. The dam is proposed with a maximum height of 45 feet and a normal pool elevation of 230.0 feet msl. The reservoir is proposed to have a conservation storage capacity of 181,000 acre-feet and would inundate about 13,000 acres.

COST: $132 million (1999)

STARTING DECADE: 2030

QUANTITY OF WATER: 90,700 acree-feet per year

LAND IMPACTED: 27,400 acres

PURPOSE: Municipal Water Supply and Flood Control

ISSUES AFFECTING FEASIBILITY:

Several rare species have been documented in the area and others are likely to occur in the project area. Documented and probable rare species that may be impacted by this project are listed below:

Documented Species:
Bald Eagle (State and Federally Threatened)
Red-cockaded Woodpecker (State and Federally Endangered)
Interior Least Tern (State and Federally Endangered)
Louisiana Pine Snake (State Threatened)
Reddish Egret Federal Species of Concern/State Threatened)
White-faced Ibis (Federal Species of Concern/State Threatened)
Wood Stork (Federal Species of Concern/State Threatened)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Texas Horned Lizard (Federal Species of Concern/State Threatened)
Alligator Snapping Turtle (Federal Species of Concern/State Threatened)
Timber Rattlesnake (Federal Species of Concern/State Threatened)
Creek Chubsucker (Federal Species of Concern/State Threatened)
Blue Sucker (Federal Species of Concern/State Threatened)
Navasota Ladies Tresses (State and Federally Endangered)

Probable Species:

Paddlefish (Federal Species of Concern/State Threatened)
Bachman's Sparrow (Federal Species of Concern/State Threatened)
Plains Spotted Skunk (State Species of Concern)
Texas Garter Snake (State Species of Concern)
Houston Toad (State and Federally Endangered)
Southeastern Myotis (State Species of Concern)

Various habitat types will be lost due to construction of Bedias Reservoir. The Cover Type and the estimated amount of acreage lost as presented in Frye and Curtis (1990) are listed below:

Cover Type:	**Acres Lost:**
Mixed Bottomland Hardwood Forest (Priority 2)	7,328
Grasses/Parks	7,036
Post Oak-Elm-Hackberry Forest	6,851
Other	3,460
Total	24,675

Construction of Bedias Reservoir will also significantly reduce instream flows and alter aquatic habitat within Bedias Creek. There is a USGS streamflow gage (#08065800) on Bedias Creek near the City of Madisonville. Monthly median flows, monthly minimums, and monthly maximums (cfs) from this gage for the period of record are reported below:

Monthly median flows (cfs) as reported from USGS gage # 08065800 near Madisonville, TX (October 1967 to current):

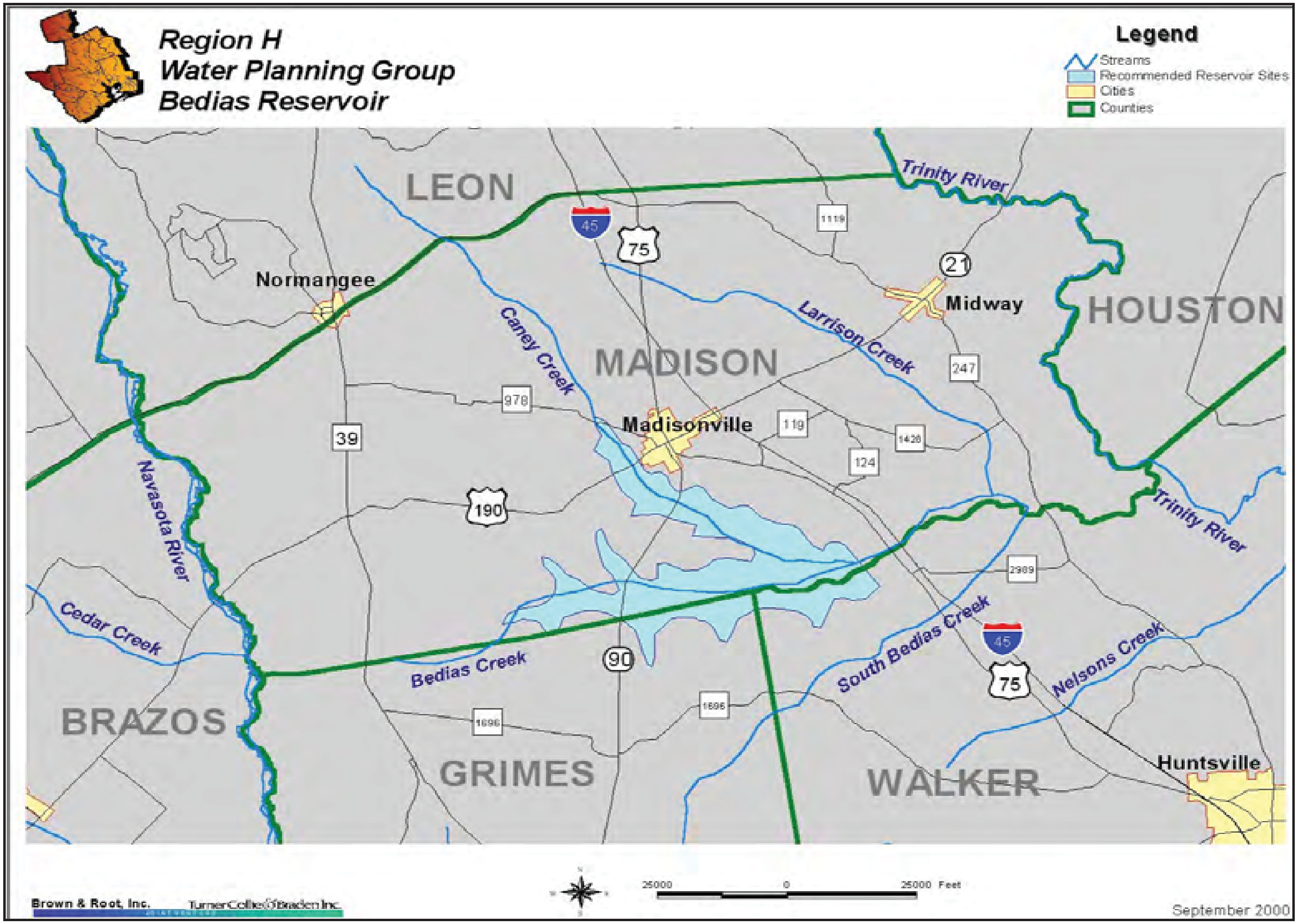
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30	38	28	18	24	7.8	1.1	0.4	0.64	0.77	4.3	16

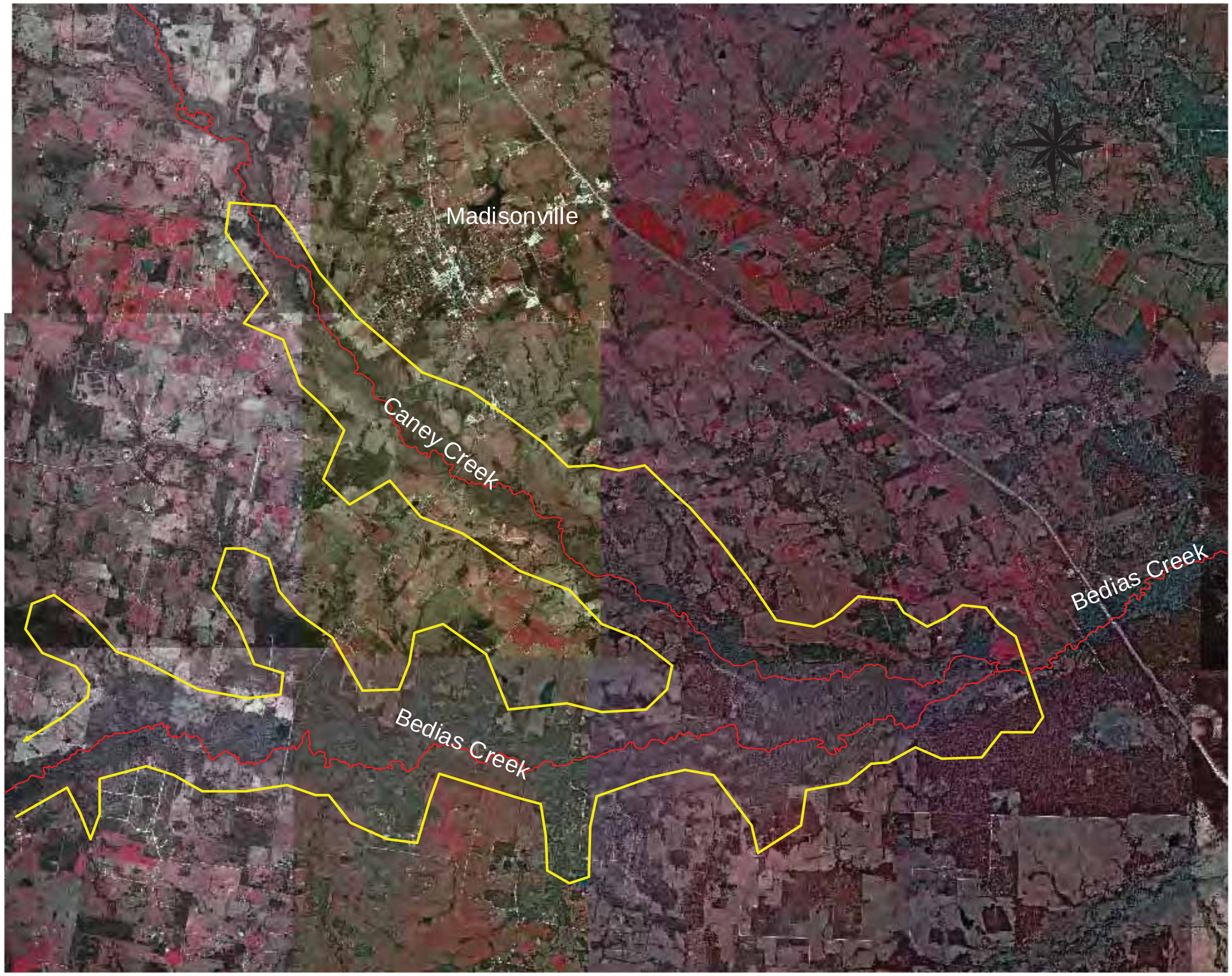
Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	3.8	3.1	2.3	2.7	0.43	0.01	0	0	0	0.03	0.2

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	1580	908	1333	1046	1745	260	266	1551	3021	932	983


Region H
Water Planning Group
Bedias Reservoir
Legend
Streams
Recommended Reservoir Sites
Cities
Counties
LEON
MADISON
HOUSTON
BRAZOS
GRIMES
WALKER
Normangee
Madisonville
Midway
Huntsville
Trinity River
Navasota River
Cedar Creek
Caney Creek
Larrison Creek
Bedias Creek
South Bedias Creek
Nelsons Creek
45
75
21
39
190
90
978
119
124
1428
247
1119
2989
1696
25000
0
25000 Feet
Brown & Root, Inc.
TurnerCollie&Braden Inc.
September 2000


Madisonville
Caney Creek
Bedias Creek
Bedias Creek

STRATEGY: Little River Reservoir

SPONSOR: Brazos River Authority, Gulf Coast Water Authority

SUMMARY

DESCRIPTION: The reservoir site is located on the Little River just upstream of its confluence with the Brazos River within Milam County. The reservoir would have a surface area of 35,000 acres and a storage volume of about 930,000 acre-feet. Currently, the upstream drainage of approximately 7,500 square miles lacks any major impoundments.

COST: $361 million (1999)

STARTING DECADE: 2000

QUANTITY OF WATER: 129,000 acre-feet per year

LAND IMPACTED: 35,000 acres

PURPOSE: Municipal Water Supply

ISSUES AFFECTING FEASIBILITY: Construction of reservoir will result in loss/alteration of 35,000 acres. The habitat types and acreage affected have not been surveyed, although bottomland hardwoods likely comprise a large portion. Several rare species may be present in the project area, including:

Houston Toad (State and Federally Endangered)
American Peregrine Falcon (State Endangered/Federally Delisted)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Interior Least Tern (State and Federally Endangered)
Zone-tailed Hawk (Federal Species of Concern/State Threatened)
Guadalupe Bass (State Species of Concern)
Texas Horned Lizard (Federal Species of Concern/State Threatened)
Navasota Ladies Tresses (State and Federally Endangered)
Parks' Jointweed (State Species of Concern)

The reservoir will also impound a currently free-flowing river, thus significantly altering instream flows and aquatic habitats. Alteration of aquatic habitat will likely affect some aquatic organisms, such as freshwater mussels. Little River is known to contain a thriving mussel population (J. Henson, pers. comm.). Nationally, 67% of freshwater mussels are rare or imperiled (Nature Conservancy, 1996). There is a USGS gage (#08106500) on Little River near the City of Cameron. Monthly median flows, monthly minimums, and monthly maximums (cfs) from this gage for the period of record are reported below:

Monthly median flows (cfs) as reported from USGS gage # 08106500 near Cameron, TX (1916 to current year):

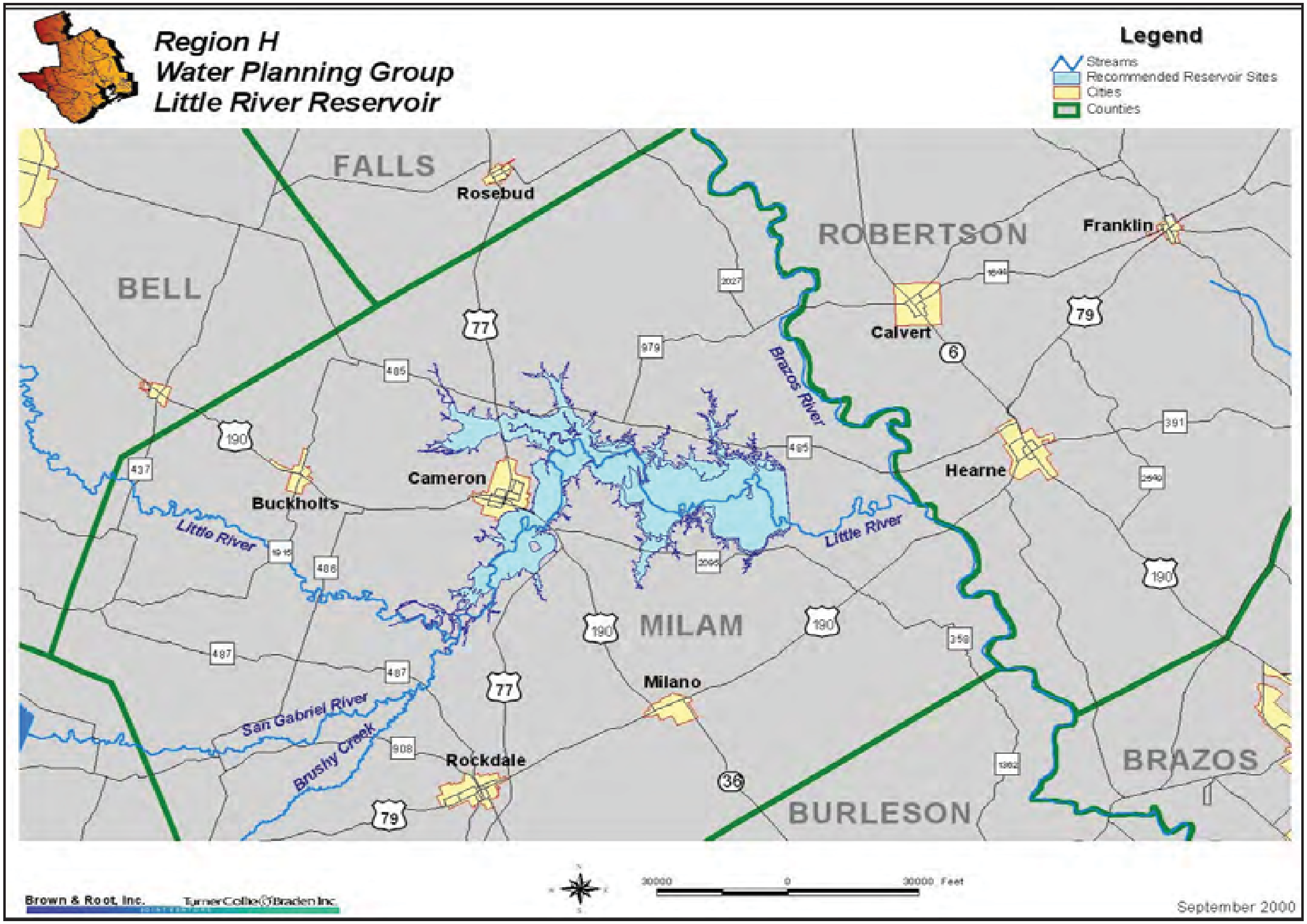
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
435	581	685	950	1520	1130	463	190	192	186	282	302

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25	41	23	16	132	15	1.6	2.2	2.1	0.77	15	23

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
9662	13031	14423	13887	17385	11326	9426	5106	26298	10139	8506	9923


Region H
Water Planning Group
Little River Reservoir
Legend
Streams
Recommended Reservoir Sites
Cities
Counties
FALLS
BELL
ROBERTSON
MILAM
BURLESON
BRAZOS
Rosebud
Franklin
Calvert
Hearne
Cameron
Buckholts
Milano
Rockdale
Little River
Brazos River
San Gabriel River
Brushy Creek
30000
0
30000 Feet
Brown & Root, Inc.
TurnerCollie&Braden Inc.
September 2000


Brazos
River
Little River
Cameron
Little River
N
W
E
S

STRATEGY: Luce Bayou Transfer

SPONSOR: City of Houston

<u>SUMMARY</u>

DESCRIPTION: The City of Houston has planned the Northeast Water Purification Plant (NEWPP) to supply need in the northern parts of Harris County. The NEWPP will take its raw water directly from Lake Houston. The City's East Water Purification Plant (EWPP) and a group of industries also draw raw water supplies from Lake Houston. By the year 2020, demands will exceed the City's raw water supplies currently available in Lake Houston.

Supplies owned by the City of Houston in the Trinity River are sufficient to meet the shortfall, however, no conveyance system exists to deliver Trinity River water to Lake Houston. The Luce Bayou strategy will supply Trinity River water to the upstream end of Luce Bayou. From there, the water will flow to and be available from Lake Houston.

Luce Bayou diversion facilities will consist of a pumping station with river intake at Capers Ridge on the west bank of the Trinity River approximately 11 miles north of Liberty. A pipeline segment followed by an earthen canal will carry the flow from the pumping station to the upstream end of Luce Bayou. To accommodate the increased flow (220 MGD by 2050), the Luce Bayou channel will be widened, deepened and straightened from its headwaters to its confluence with Tarkington Bayou.

COST: $84 million (1999)

STARTING DECADE: 2020

QUANTITY OF WATER: 302,500 acre-feet per year

SUPPLY SOURCE: Trinity River

ISSUES AFFECTING FEASIBILITY: Construction of the Luce Bayou project will require rectification of approximately eight miles of Luce Bayou, altering the aquatic habitat and ecology in that segment, and possibly in downstream segments. The mixing of Trinity River water and San Jacinto River water in Lake Houston may have an adverse impact on the lake's ecology. Increased use of stored water from Lake Livingston may result in periodic or prolonged low lake levels, which may adversely impact the lake's ecology and/or recreational activities.

Land use in the Lake Houston drainage basin is about 73% forest and 14% pasture. Luce Bayou is bordered by one of the highest quality bottomland hardwood forests remaining in the Houston area. The Region H plan states "wetlands mitigation may be required to offset losses due to pumping station, pipeline, and canal construction." This is true, however, the rectification of Luce Bayou and subsequent impacts to riparian habitats will also likely require significant mitigation. Mitigation may also be required for impacts to rare species, as several may be present in the project area, including:

Houston Toad (State and Federally Endangered)
American Peregrine Falcon (State Endangered/Federally Delisted)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Reddish Egret (Federal Species of Concern/State Threatened)
White-faced Ibis (Federal Species of Concern/State Threatened)
Wood Stork (Federal Species of Concern/State Threatened)
Attwater's Greater Prairie Chicken (State and Federally Endangered)
Bald Eagle (State and Federally Threatened)
Henslow's Sparrow (State Species of Concern)
Mountain Plover (State Species of Concern)
Piping Plover (State and Federally Endangered)
Black Rail (State Species of Concern)
Brown Pelican (State and Federally Endangered)
Snowy Plover (State Species of Concern)
Swallow-tailed Kite (Federal Species of Concern/State Threatened)
Creek Chubsucker (Federal Species of Concern/State Threatened)
Plains Spotted Skunk (State Species of Concern)
Rafinesque's Big-eared Bat (Federal Species of Concern/State Threatened)
Southeastern Myotis (State Species of Concern)
Alligator Snapping Turtle (Federal Species of Concern/State Threatened)
Timber Rattlesnake (Federal Species of Concern/State Threatened)
Smooth Green Snake (Federal Species of Concern/State Threatened)
Texas Garter Snake (State Species of Concern)
Corkwood (State Species of Concern)
Giant Sharpstem Umbrella-sedge (State Species of Concern)
Houston Daisy (State Species of Concern)
Threeflower Broomweed (State Species of Concern)

Increased flows in Luce Bayou, which are estimated to be as high as 220 MGD (341 cfs) by the year 2050, will greatly affect aquatic organisms and may result in erosion problems. There is a USGS gage (#08071280) on Luce Bayou near the City of Huffman. Monthly median flows, monthly minimums, and monthly maximums (cfs) from this gage for the period of record are reported below:

Monthly median flows (cfs) as reported from USGS gage # 08071280 near Huffman, TX (May 1984 to current year):

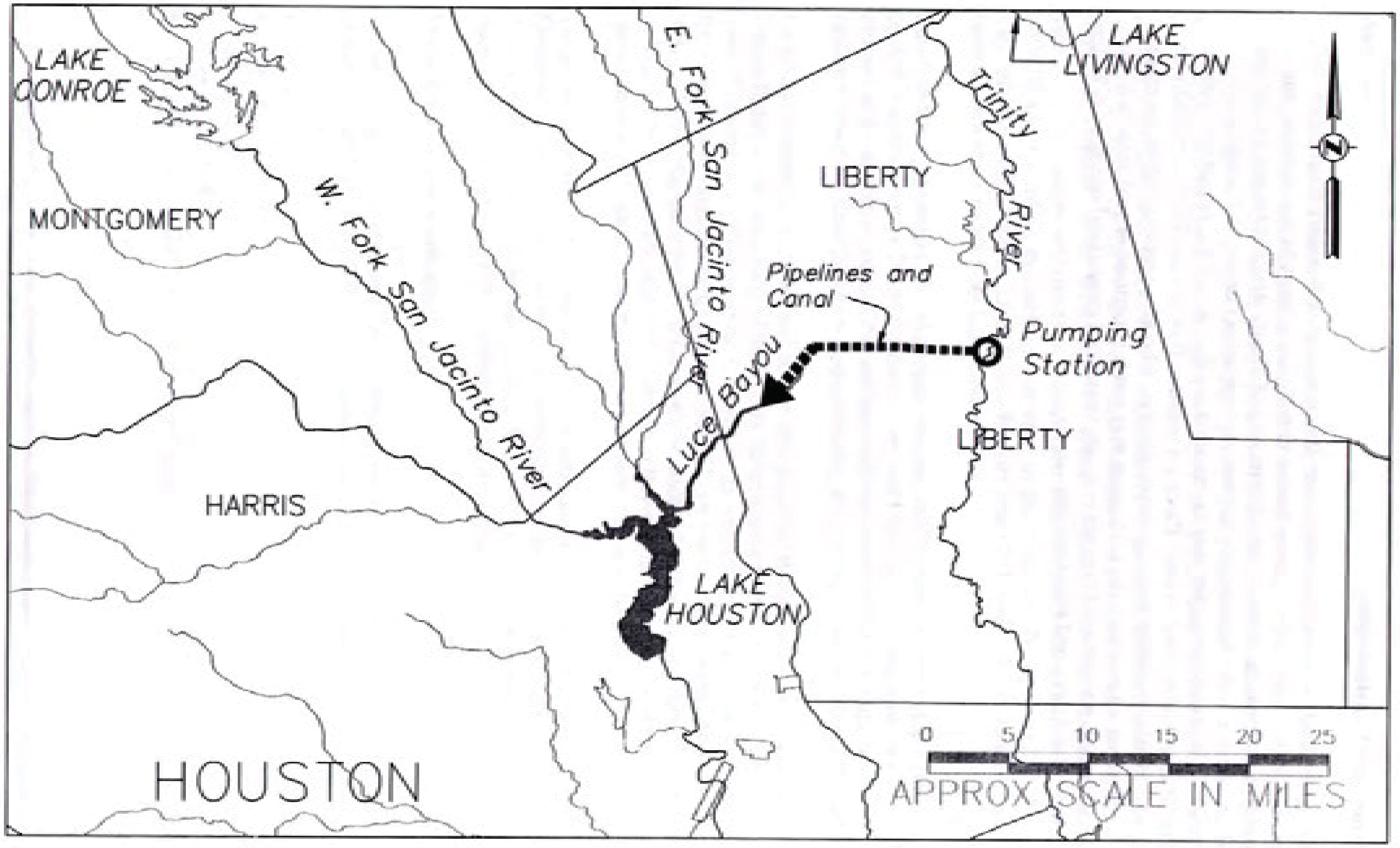
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
61	50	62	14	10	6.7	2.7	1.1	1.6	1.6	8.4	31

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.1	1.3	1.6	3.1	0.57	0.12	0.01	0.35	0.03	0.01	0.17	1.4

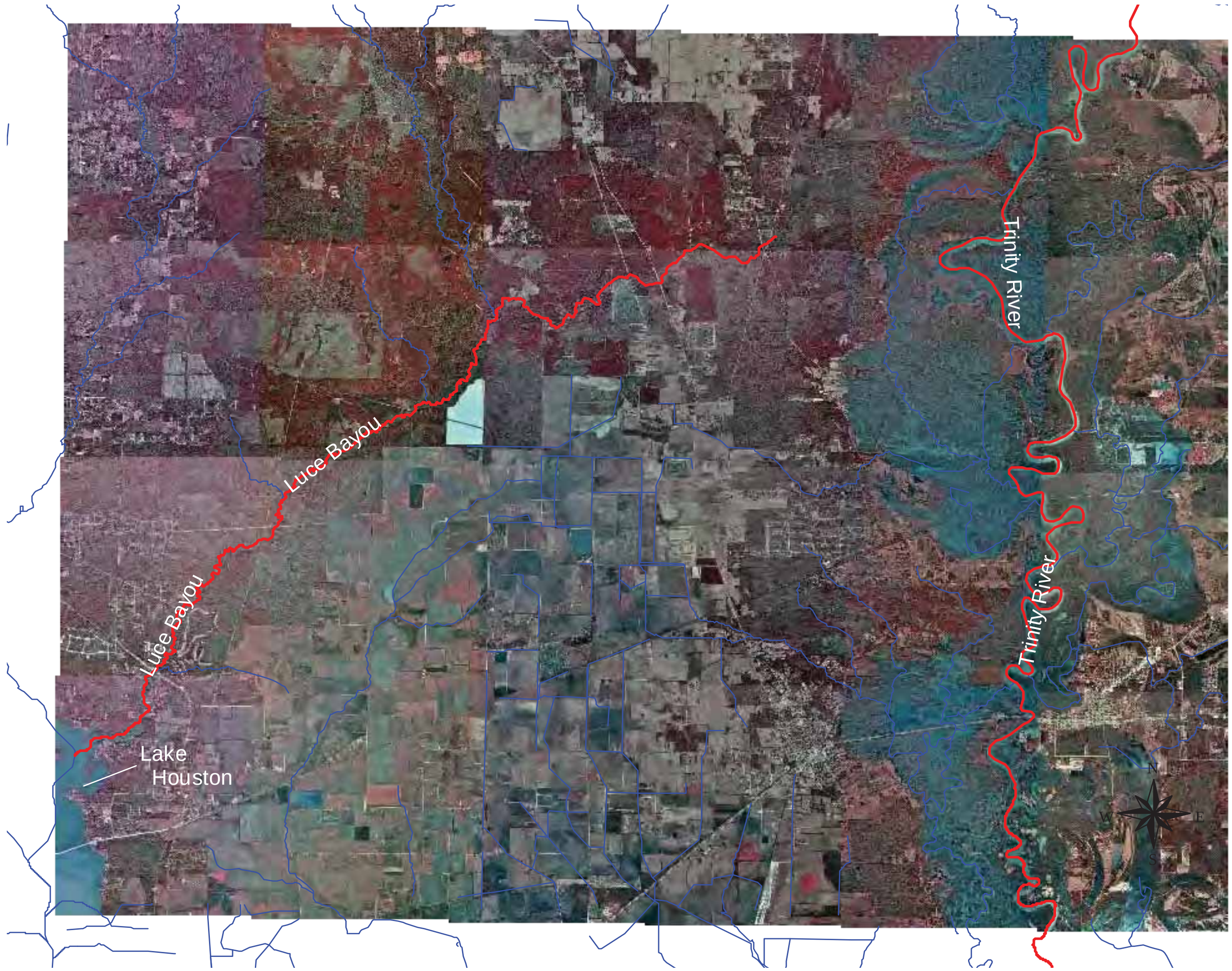
Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
826	980	878	1047	2443	1965	333	102	394	2988	1416	862



LUCE BAYOU
INTERBASIN TRANSFER
TRINITY TO SAN JACINTO

FIGURE 1


Luce Bayou
Luce Bayou
Lake Houston
Trinity River
Trinity River

STRATEGY: San Jacinto River Authority/City of Houston Contract

SPONSOR: San Jacinto River Authority, City of Houston

SUMMARY

DESCRIPTION: This contractual transfer would consist of a water exchange between the San Jacinto River Authority (SJRA) and the City of Houston that would allow the SJRA to capture the City of Houston's water supplies within Lake Conroe so as to meet the SJRA Northern region water needs. In exchange, the SJRA would transfer a like quantity of water supplies from either or both of the SJRA San Jacinto run-of-river and/or Trinity River water supplies.

Lake Conroe has water rights associated with its water that is owned by the SJRA (32,921 acre-feet per year) and the City of Houston (67,029 acre-feet per year). The City of Houston owns all of the water rights within Lake Houston (168,000 acre-feet per year) and the SJRA owns the 55,000 acre-feet per year of run-of-river water rights that are diverted at Lake Houston. Additionally, SJRA owns 56,000 acre-feet per year of Trinity River water rights that are diverted at the Coastal Water Authority (CWA) canal. Therefore, the SJRA has a total of 143,921 acre-feet per year of surface water rights.

COST: Unknown, potentially zero

STARTING DECADE: 2000

QUANTITY OF WATER: 67,029 acre-feet per year

SUPPLY SOURCE: Lake Conroe

ISSUES AFFECTING FEASIBILITY: Use of this strategy will reduce the quantity of instream flows in the segment of the West Fork San Jacinto River between Lake Conroe and Lake Houston. There are two USGS gage stations located on the West Fork San Jacinto River near the City of Conroe, one downstream of Lake Conroe (USGS gage # 08067650) and one further downstream (USGS gage # 08068000). There is also a USGS gage station on the West Fork San Jacinto River upstream of Lake Houston near the City of Porter (USGS gage # 08068090). Monthly median flows, monthly minimums, and monthly maximums (cfs) from these gages for the period of record are reported below:

Monthly median flows (cfs) as reported from USGS gage # 08067650 downstream of Lake Conroe near Conroe, TX (1972 to current year):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
73	236	19.5	4.35	12	2.5	0.92	0.60	1.6	3.4	8.2	100

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	0.16	0	0	0	0	0	0	0

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1776	1349	856	1815	1899	1143	231	124	820	601	3003	1023

Monthly median flows (cfs) as reported from USGS gage # 08068000 near Conroe, TX (July 1939 to current year):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
192	241	156	114	122	66	34	26	30	32	60	136

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
19.7	22.5	20.4	26.0	18.9	15.4	11.2	7.96	6.3	8.1	10.4	21.5

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3360	3258	2319	5446	4153	3086	977	1899	1945	7836	6834	3484

Monthly median flows (cfs) as reported from USGS gage # 08068090 upstream of Lake Houston near Porter, TX (May 1984 to current year):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
348	394	245	134	130	102	52.5	44	45	47	101	236

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
41.5	37.8	34.2	60.7	59.4	31.8	17.2	16.1	23.3	22.2	29.8	42.7

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3199	3763	2041	2229	2174	3169	535.9	222.5	323.3	10908	8244	1881

Reductions in instream flows will likely cause alteration/loss of aquatic habitat and may impact aquatic organisms as well as riparian habitats. Several rare species may be found in Montgomery County, including:

American Peregrine Falcon (State Endangered/Federally Delisted)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Bachman's Sparrow (Federal Species of Concern/State Threatened)
Bald Eagle (State and Federally Threatened)
Swallow-tailed Kite (Federal Species of Concern/State Threatened)
Henslow's Sparrow (State Species of Concern)
Red-cockaded Woodpecker (State and Federally Endangered)
White-faced Ibis (Federal Species of Concern/State Threatened)

Wood Stork (Federal Species of Concern/State Threatened)
Creek Chubsucker (Federal Species of Concern/State Threatened)
Paddlefish (Federal Species of Concern/State Threatened)
Plains Spotted Skunk (State Species of Concern)
Rafinesque's Big-eared Bat (Federal Species of Concern/State Threatened)
Southeastern Myotis (State Species of Concern)
Alligator Snapping Turtle (Federal Species of Concern/State Threatened)
Timber Rattlesnake (Federal Species of Concern/State Threatened)
Texas Garter Snake (State Species of Concern)
Louisiana Pine Snake (Federal Candidate for listing/State Threatened)
Correll's False Dragonhead (State Species of Concern)

STRATEGY: San Jacinto River Authority/Lake Livingston Diversion

SPONSOR: San Jacinto River Authority

SUMMARY

DESCRIPTION: This strategy involves diverting flows from Lake Livingston into the West Fork San Jacinto River, which will then be conveyed into Lake Conroe. From Lake Conroe, these supplies will be used to either serve the San Jacinto River Authority (SJRA) Northern basin demands or can be conveyed through the SJRA East Canal and Highlands system to meet water needs within the SJRA Southern basin. The assumption is that the SJRA will secure approximately 75,000 acre-feet per year from a water source within the Trinity basin.

This strategy is an interbasin transfer and as such will be subject to the junior water rights provision of Senate Bill 1. The needed conveyance system would consist of the following facilities:

1) a raw water intake in Lake Livingston near the Town of Point Blank
2) a raw water pump station (70 mgd capacity)
3) approximately 30 miles of 60-inch transmission main

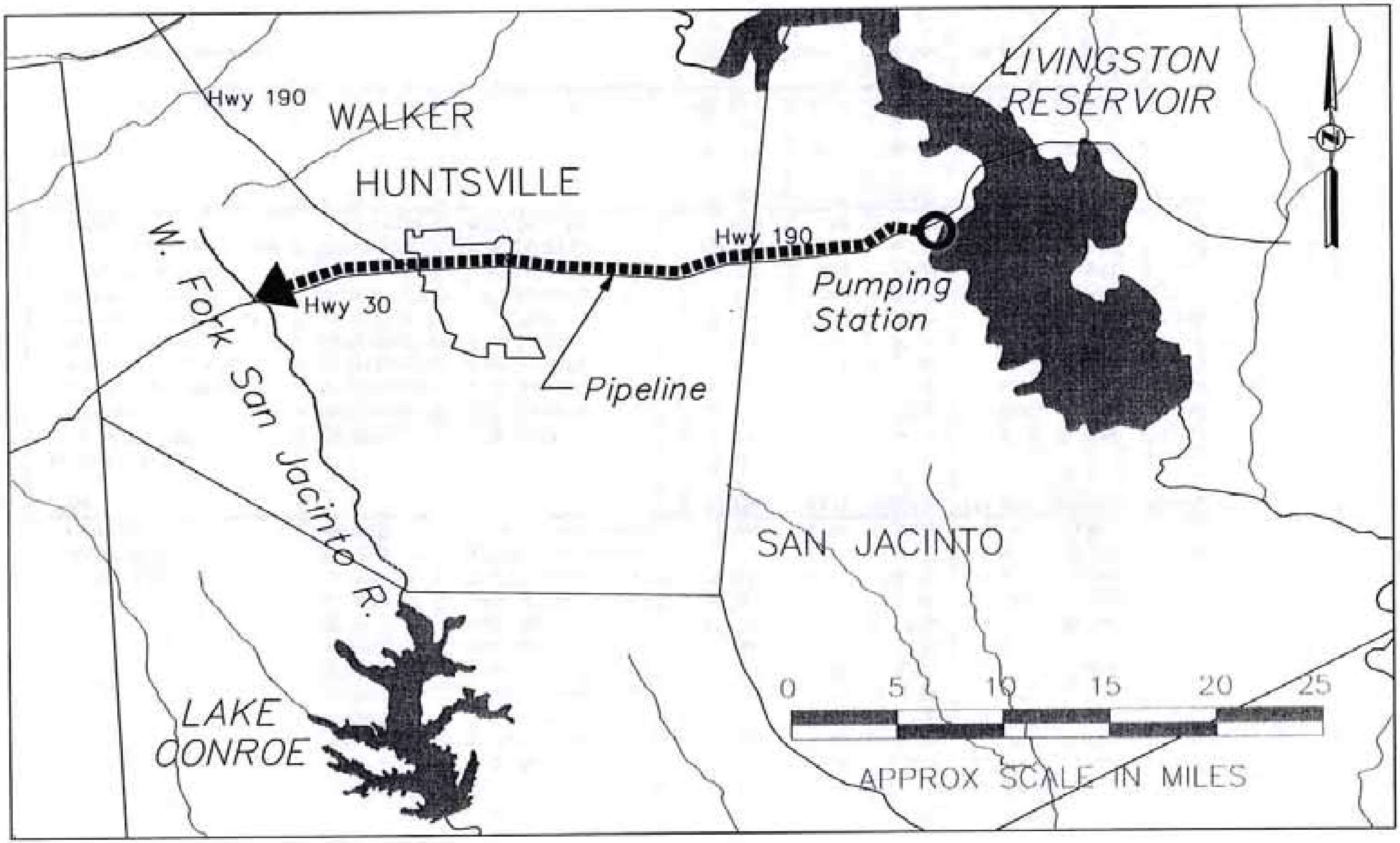
COST: $133,800,000

STARTING DECADE: 2030

QUANTITY OF WATER: 75,000 acre-feet per year

SUPPLY SOURCE: Trinity River water supplies

ISSUES AFFECTING FEASIBILITY: Environmental concerns related to this project include construction within the upper West Fork San Jacinto River channel and rectification of some segment of the river will likely be required. Increased use of stored water from Lake Livingston may result in periodic or prolonged low lake levels. This strategy (as well as many others) would decrease freshwater inflows to the Trinity Bay estuary as water will be leaving the Trinity River Basin.



LAKE LIVINGSTON TO LAKE CONROE
INTERBASIN TRANSFER

FIGURE 1

STRATEGY: Trinity River Authority/City of Houston Contract Agreement

SPONSOR: Trinity River Authority, City of Houston

SUMMARY

DESCRIPTION: The Trinity River Authority (TRA) is projected to have uncommitted surface water supplies (255,392 acre-feet per year) from their water rights within the Lake Livingston-Wallisville Salt Water Barrier system through 2050. This water supply exists as stored water within Lake Livingston. Through financial considerations associated with the 1964 construction contract for the Lake Livingston-Wallisville Salt Water Barrier project, the City of Houston has a preferred position relative to purchase of uncommitted water supplies from TRA's share of the Livingston-Wallisville system.

Diversion of these water supplies can occur either directly from Lake Livingston or at any point downstream of Lake Livingston. Two potential diversion points and conveyance routes include use of the existing Coastal Water Authority (CWA) canal system at the Trinity River Pump Station and/or a new potential route from the Trinity River to Lake Houston via Luce Bayou. If the Luce Bayou system is required to provide supply to the proposed Northeast Water Purification Plant (as is discussed under the Luce Bayou Diversion plan earlier in this document), then the CWA canal system would have sufficient excess capacity because previously utilized Lake Livingston flows would be diverted into Luce Bayou thereby freeing up capacity to convey up to 200,000 acre-feet per year.

COST: Unknown

STARTING DECADE: after 2030

QUANTITY OF WATER: up to 200,000 acre-feet per year

SUPPLY SOURCE: Trinity River water supplies

ISSUES AFFECTING FEASIBILITY: Additional transfer of Trinity River water supplies into the San Jacinto River basin will decrease freshwater inflows into the Trinity Bay estuary and may negatively impact wetland, aquatic, and riparian habitats. Several rare species may be found in Liberty and/or Chambers County, including:

American Peregrine Falcon (State Endangered/Federally Delisted)
Arctic Peregrine Falcon (State Threatened/Federally Delisted)
Bachman's Sparrow (Federal Species of Concern/State Threatened)
Bald Eagle (State and Federally Threatened)
Interior Least Tern (State and Federally Endangered)
Piping Plover (State and Federally Endangered)
Swallow-tailed Kite (Federal Species of Concern/State Threatened)
Henslow's Sparrow (State Species of Concern)

Red-cockaded Woodpecker (State and Federally Endangered)
White-faced Ibis (Federal Species of Concern/State Threatened)
Wood Stork (Federal Species of Concern/State Threatened)
Plains Spotted Skunk (State Species of Concern)
Rafinesque's Big-eared Bat (Federal Species of Concern/State Threatened)
Southeastern Myotis (State Species of Concern)
Alligator Snapping Turtle (Federal Species of Concern/State Threatened)
Timber Rattlesnake (Federal Species of Concern/State Threatened)
Texas Diamondback Terrapin (State Species of Concern)
Atlantic Hawksbill Sea Turtle (State and Federally Endangered)
Green Sea Turtle (State and Federally Threatened)
Gulf Saltmarsh Snake (State Species of Concern)
Kemp's Ridley Sea Turtle (State and Federally Endangered)
Leatherback Sea Turtle (State and Federally Endangered)
Loggerhead Sea Turtle (State and Federally Threatened)
Smooth Green Snake (Federal Species of Concern/State Threatened)
Corkwood (State Species of Concern)
Scarlet Catchfly (State Species of Concern)
Texas Windmill-grass (State Species of Concern)

Instream flows downstream of the CWA canal diversion point will also decrease as a result of additional transfers. The Coastal Water Authority's diversion point is located downstream of the City of Dayton. There is a USGS gage station (gage #08067000) on the Trinity River near the City of Liberty; however, there are no USGS gages downstream of the CWA diversion point. Monthly median flows, monthly minimums, and monthly maximums (cfs) from the gage near the City of Liberty for the period of record are reported below:

Monthly median flows (cfs) as reported from USGS gage # 08067000 near Liberty, TX (October 1940 to current year):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
19300	19000	20050	23650	21000	21800	14100	10000	9140	22750	20400	17000

Monthly Minimum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20317	10769	5139	21685	8311	14490	9135	---	---	26320	16912	14005

Monthly Maximum (cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
55526	42183	47913	31300	56261	31591	9135	---	---	26320	31800	29416

STRATEGY: Bedias Reservoir – SJRA Interbasin Transfer

SPONSOR: San Jacinto River Authority, Trinity River Authority

SUMMARY

DESCRIPTION: This strategy consists of defining the facilities necessary to impound and transport water supplies from the Trinity River basin to the upper San Jacinto River basin. The impoundment of water in the Trinity River basin involves the construction of Bedias Creek Reservoir by TRA and SJRA. The SJRA will require additional facilities to convey a portion of the created supplies into the West Fork of the San Jacinto River for use by SJRA. A transmission system, consisting of the following, was defined to convey approximately 75,000 acre-feet per year:

1) A raw water intake at the southeast end of the dam
2) A raw water pump station (70 mgd capacity)
3) Approximately 15 miles of 60-inch transmission main
4) Approximately 2 miles of channel improvements to Mock Branch (tributary to the West Fork San Jacinto River), where water will be discharged for conveyance to Lake Conroe.

COST: $194,340,000

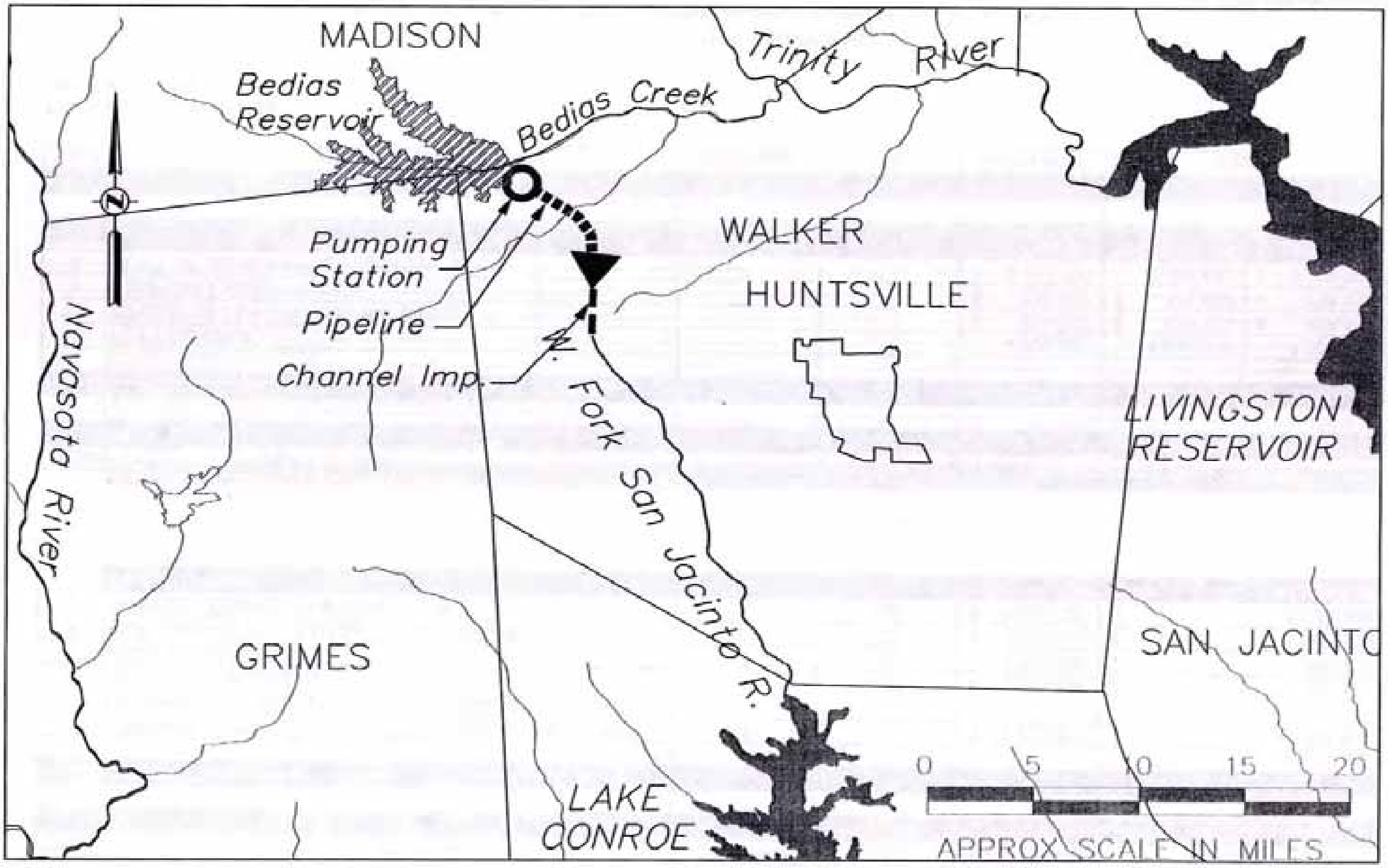
STARTING DECADE: 2030

QUANTITY OF WATER: 90,700 acre-feet per year
75,000 acre-feet per year to SJRA
15,700 acre-feet per year to TRA

SUPPLY SOURCE: Bedias Creek Reservoir (to be created)

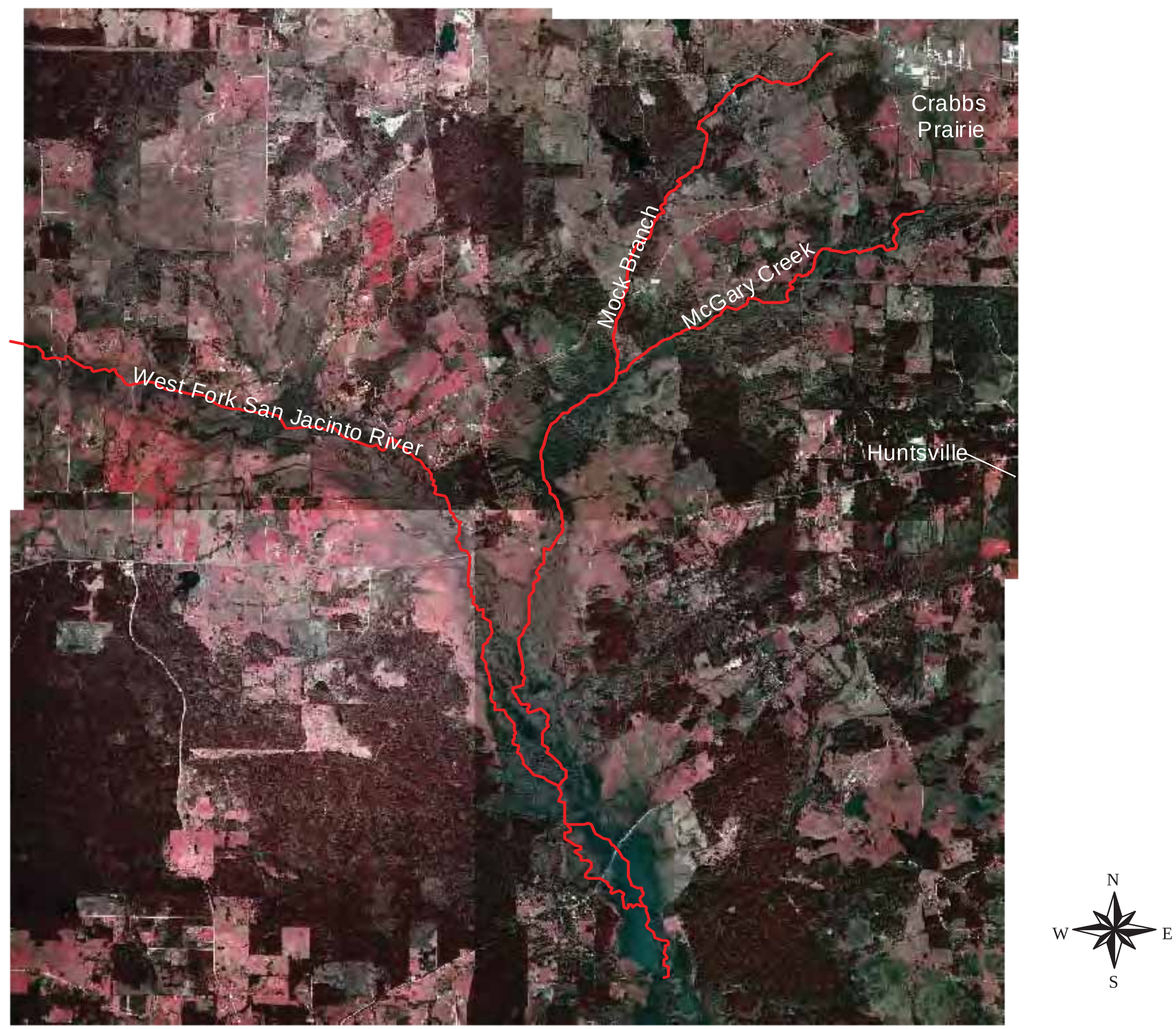
ISSUES AFFECTING FEASIBILITY: Issues related to the construction of Bedias Reservoir were discussed previously. The transfer of water to the San Jacinto River basin will require rectification of Mock Branch and may require rectification of some segment of McGary Creek and the West Fork San Jacinto River, which will affect aquatic, riparian, and wetland habitats. Increased flows in Mock Branch as well as McGary Creek and the West Fork San Jacinto River may also negatively impact these habitats and the aquatic community. Pipeline construction will have impacts to terrestrial, wetland, and aquatic habitats. This project will also likely decrease freshwater inflows to the Trinity River estuary as water is leaving the Trinity basin.

*No mention is made of McGary Creek in the Environmental Concerns section related to this project within the Region H water plan.



BEDIAS RESERVOIR TO LAKE CONROE
INTERBASIN TRANSFER

FIGURE 1


Crabbs
Prairie
Mock Branch
McGary Creek
West Fork San Jacinto River
Huntsville
N
W
E
S

STRATEGY: Gulf Coast Water Authority/City of Houston Contract

SPONSOR: Gulf Coast Water Authority, City of Houston, Coastal Water Authority

SUMMARY

DESCRIPTION: Under this strategy the Gulf Coast Water Authority (GCWA) will purchase Trinity River water from the City of Houston and convey that water from the Coastal Water Authority (CWA) Bayport Reservoir to the Texas City Reservoir owned by the GCWA. This will require the development of a conveyance system between the reservoirs, which was defined to consist of the following:

1) A raw water pump station (25 mgd capacity)
2) Approximately 16 miles of 36-inch transmission main
3) Two channel crossings at Clear Lake and Dickinson Bayou

COST: $63,270,000

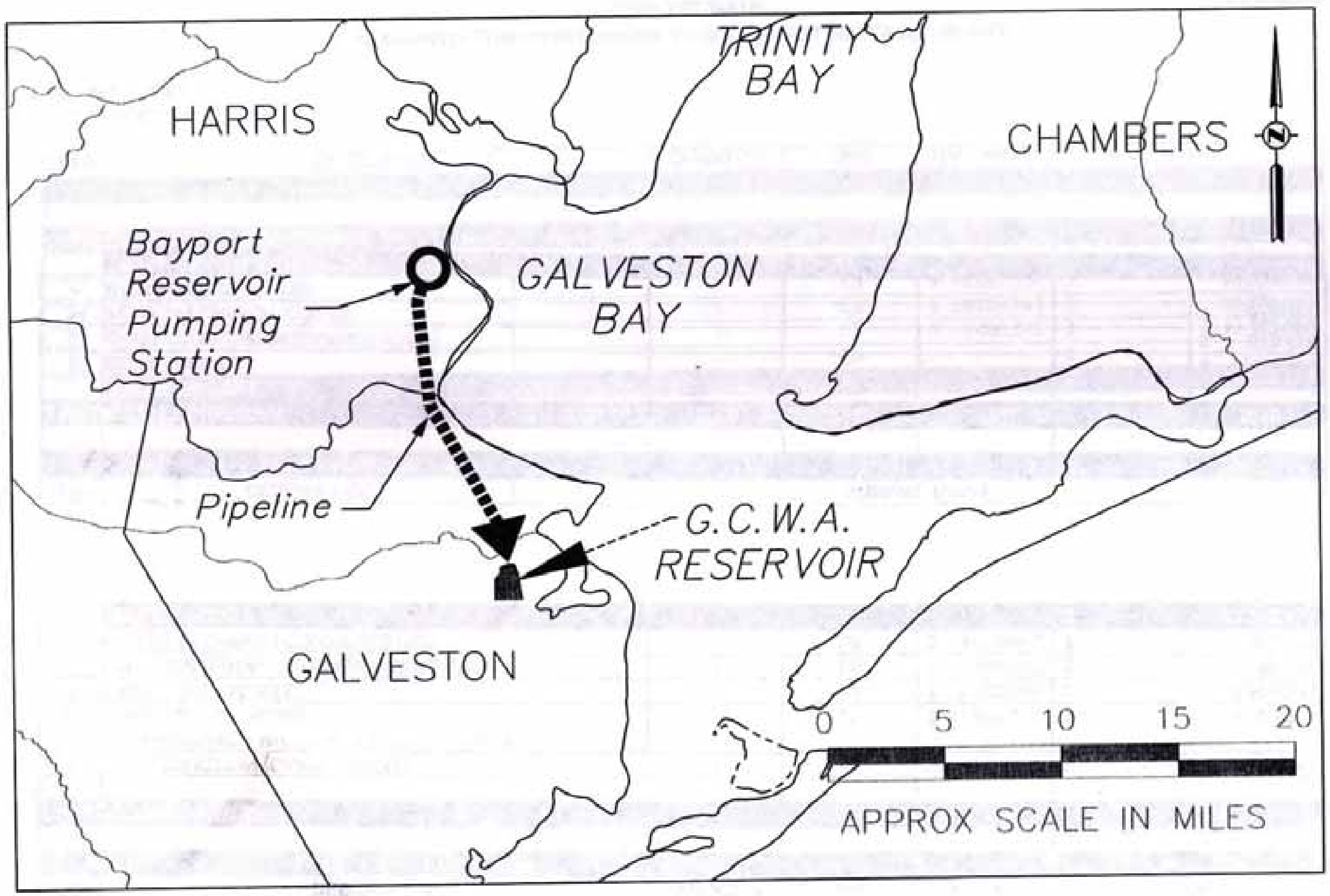
STARTING DECADE: 2040

*this strategy may be initiated earlier to allow the GCWA to allocate more of its Brazos River supplies to Fort Bend and Brazoria County WUG demands.

QUANTITY OF WATER: 23,000 acre-feet per year

SUPPLY SOURCE: City of Houston (Trinity River water supplies)

ISSUES AFFECTING FEASIBILITY: While the ultimate outfall of this water still remains in the Galveston Bay estuary, the timing and location of the freshwater inflow will be altered. The inflow would be moved from Upper Trinity Bay to western Galveston Bay. From the description of this project in the Region H water plan it is not clear how the water will be conveyed from the Trinity River to the Bayport Reservoir.



CWA–BAYPORT TO GCWA TEXAS CITY TRANSFER ROUTE

FIGURE 1

STRATEGY: Sabine River to Region H Interbasin Transfer

SPONSOR: SJRA, BRA, GCWA, and the City of Houston

SUMMARY

DESCRIPTION: Under this strategy surplus raw water supplies in the Sabine Basin would be transferred to the major water providers within the San Jacinto Basin (the City of Houston and the San Jacinto River Authority) and in the Brazos River Basin (the Brazos River Authority and the Gulf Coast Water Authority) that have projected supply deficits. Water will be pumped from the Sabine River upstream of the City of Orange and conveyed via Sabine River Authority canals to the Lower Neches Valley Authority (LNVA) canal system at the LNVA First Lift Pumping Station north of Beaumont. LNVA canals will carry the flow west and discharge it into the Trinity River upstream of the Coastal Water Authority Trinity River Pumping Station. New canals, pumping stations, and pipelines will need to be constructed where it is not feasible to use existing facilities.

The Region H plan surmises that with Sabine River water to replenish the lower Trinity water, additional withdrawals can be made from Lake Livingston. An integral part of this strategy is a pipeline from Lake Livingston discharging into Rocky Creek. Rocky Creek is a tributary to the Navasota River downstream of Gibbons Creek Lake and the Navasota empties into the Brazos River. This transfer would supply the projected BRA and GCWA shortfalls in Region H.

The City of Houston's supply deficits would be alleviated by delivery of Sabine River water to the Trinity River upstream of the existing CWA Trinity River Pumping Station near Dayton. The TRPS will pump the water to CWA's Lynchburg Reservoir from which it will be distributed to the City of Houston's East and Southeast Water Purification Plants.

Delivery of Sabine River water to the lower Trinity River would allow SJRA to take their 56,000 acre-feet per year from Lake Livingston, instead of the current method of pumping Trinity River water through the CWA canal system that supplies the Lynchburg Reservoir. However, the SJRA has a projected additional shortfall of 18,600 acre-feet per year. The SJRA will need to exchange this amount of Sabine water delivered to the lower Trinty River for an equivalent quantity of water in Lake Livingston. The 74,600 acre-feet per year of water needed can then be delivered to the upper reaches of the West Fork San Jacinto River via Lake Livingston to Rocky Creek pipeline described above.

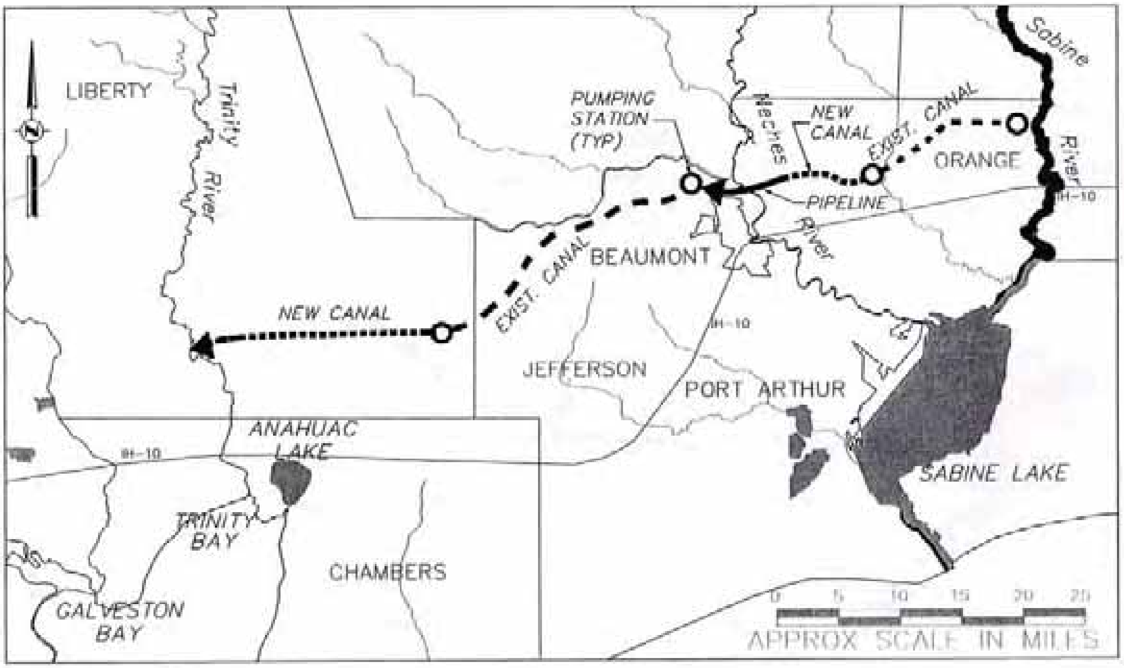
COST: $809,944,000

STARTING DECADE: 2010

QUANTITY OF WATER: 101,500 acre-feet per year in 2010, increasing to 453,100 acre-feet per year by 2050

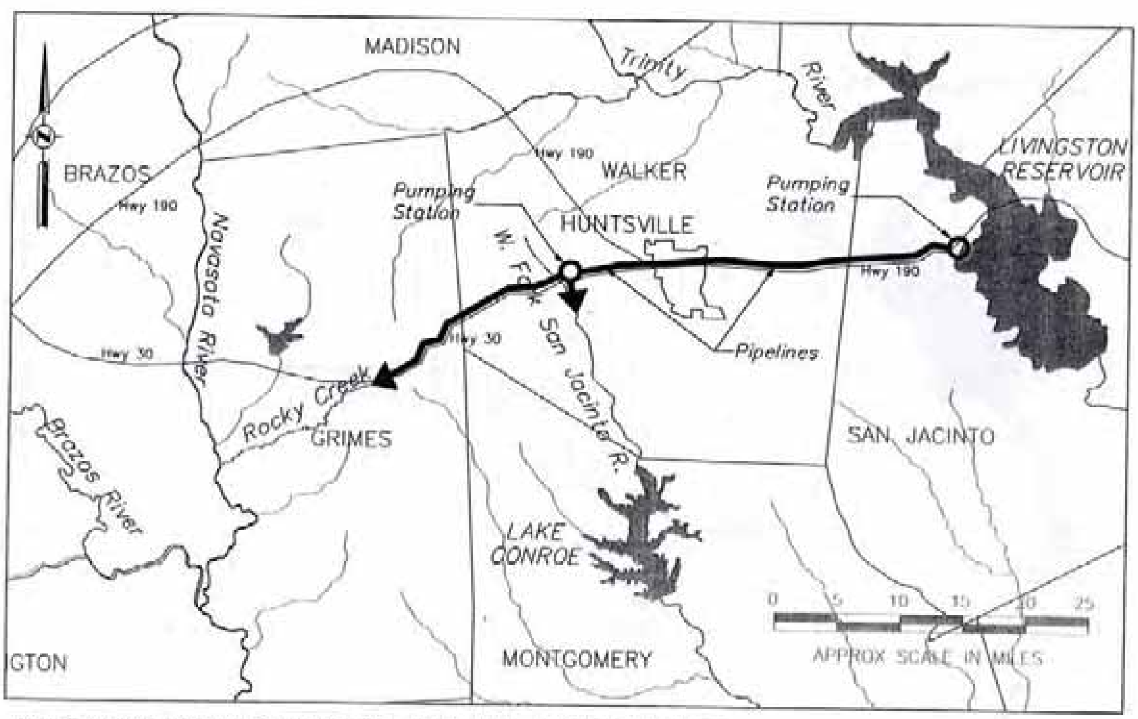
SUPPLY SOURCE: Sabine River

ISSUES AFFECTING FEASIBILITY: The transfer of this quantity of water out of the Sabine River Basin will significantly reduce freshwater inflows to the Sabine Lake estuary. This strategy will require further study to fully assess the potential ecological effects on the estuary. Also, the State of Louisiana and local Sabine Lake interests have historically voiced concern about a large-scale water transfer of this type.



SABINE TO TRINITY
INTERBASIN TRANSFER

FIGURE 1



LAKE LIVINGSTON TO BRAZOS AND SAN JACINTO RIVERS
INTERBASIN TRANSFER

FIGURE 2

Other Potential Water Management Strategies for Region H

1) Municipal Water Conservation
2) Irrigation Conservation
3) Wastewater Reclamation/Reuse
4) Desalination

Appendix 7D

Estimated Municipal Return Flows and Recommended Reuse

This Page Intentionally
Left Blank

Estimated Municipal Return Flows and Reuse

To evaluate the effects of recommended reuse strategies on stream-flows, current and future municipal return flows were estimated. Currently, 60% of municipal water supply returns to streams and bayous via wastewater treatment plants. As water saving fixtures reduce in-home use, that return percentage was assumed to decline to 50%. As can be seen in the table, the total municipal wastewater return flow is expected to increase from 605,000 ac-ft/yr in the year 2010 to 922,000 ac-ft/yr in the year 2060. In Harris County and the surrounding areas, these municipal return flows are a significant portion of the in-stream freshwater flow, and for some streams the only source of flows during drought periods.

Wastewater reuse is permitted for the San Jacinto River Authority in Montgomery County, and is recommended in Harris County for industry, the City of Houston, the North Harris County Regional Water Authority, and in smaller volumes for several additional WUGs. Total reuse supplied from return flows in the San Jacinto basin should increase from 14,944 ac-ft/yr in 2010 to 272,582 ac-ft/yr in 2060.

Table 7D-1 shows the estimated municipal return flows for each county, and for Houston and the NHCRWA, which are recommended for significant future reuse. As can be seen, the net return flow from Harris County will decline as reuse projects come on-line, but not below 70% of the current county return flow. The San Jacinto Basin overall will also see declines in net return flow as reuse projects come on-line, but is not projected to drop below 90% of the current return flow levels.

**This Page
Intentionally Left Blank**

	unici al ater emand						stimated unici al Return lo					
Counties												
Austin	4,123	4,658	5,027	5,191	5,278	5,446	2,391	2,608	2,715	2,699	2,639	2,723
Bra oria	47,184	53,523	59,656	65,134	71,567	78,598	27,367	29,973	32,214	33,870	35,784	39,299
C ambers	4,985	5,854	6,648	7,338	8,067	8,863	2,891	3,278	3,590	3,816	4,034	4,432
Fort Bend	109,869	143,023	174,552	208,691	251,533	300,689	63,724	80,093	94,258	108,519	125,767	150,345
Galveston	46,090	47,390	47,818	47,487	47,393	47,641	26,732	26,538	25,822	24,693	23,697	23,821
Harris	709,300	789,397	868,320	948,412	1,030,899	1,119,593	411,394	442,062	468,893	493,174	515,450	559,797
Leon	2,128	2,376	2,489	2,456	2,414	2,437	1,234	1,331	1,344	1,277	1,207	1,219
Liberty	10,470	11,759	12,980	14,211	15,629	17,362	6,073	6,585	7,009	7,390	7,815	8,681
Madison	1,793	1,867	1,921	1,954	2,010	2,075	1,040	1,046	1,037	1,016	1,005	1,038
Montgomery	74,871	98,947	122,197	146,984	180,292	219,432	43,425	55,410	65,986	76,432	90,146	109,716
Pol	5,062	5,632	6,046	6,335	6,693	7,088	2,936	3,154	3,265	3,294	3,347	3,544
San Jacinto	3,153	3,616	3,964	4,120	4,207	4,251	2,317	2,571	2,709	2,645	2,559	2,538
Trinity	1,203	1,260	1,255	1,206	1,145	1,102	698	706	678	627	573	551
Wal er	16,920	16,607	17,244	16,240	16,042	15,786	9,814	9,300	9,312	8,445	8,021	7,893
Waller	5,713	7,003	8,469	10,084	12,093	14,454	3,314	3,922	4,573	5,244	6,047	7,227
Total Estimated Return Flows							605,349	668,577	723,405	773,141	828,087	922,821
WUGs wit Reuse WMS greater t an 50,000 afy												
HOUSTON	389,082	429,218	467,036	506,047	547,787	593,096	225,668	240,362	252,199	263,144	273,894	296,548
NHCRWA	116,062	136,903	152,789	161,456	164,968	169,178	67,316	76,666	82,506	83,957	82,484	84,589
San Jacinto River Basin (total for all counties)	774,979	885,100	991,261	1,100,192	1,217,947	1,347,121	449,488	495,656	535,281	572,100	608,974	673,561
Reuse WMS												
Montgomery County GRP							0	759	943	1015	1,017	1,018
Municipal Non-potable Reuse							0	0	5,488	11,480	18,207	25,302
NHCRWA - Indirect Reuse							0	0	0	18800	46000	89,000
SJRA-Indirect							14,944	14,944	14,944	14,944	14,944	14,944
Wastewater Reuse for Industry							0	0	0	0	0	67,200
Houston - indirect Reuse							0	0	0	48,290	75,118	75,118
Total stimated Reuse												
Harris County Net Return Flow							411,394	441,303	462,462	413,589	375,108	302,159
San Jacinto Basin Net Return Flow							434,544	479,953	513,906	477,571	453,688	400,979

includes Jersey Village and Tomball (member cities)
includes portions wit in San Jacinto Basin
includes portions wit in San Jacinto Basin
e cludes SJRA indirect Resue from Montgomery County

Contents

This Page

Intentionally Left Blank

Chapter 8 – Ecologically Unique Stream Segments, Unique Reservoir Sites and Legislative Recommendations

8.1 Introduction

Chapter 31 TAC 357.7 (a)(10) of the Texas Water Code specifies that the regional water plan shall include recommendations on regulatory, administrative, or legislative issues. The regional water planning group establishes these recommendations in order to facilitate the orderly development, management, and conservation of water resources. In addition, the group forms recommendations to prepare for and respond to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the state and regional water planning area. Furthermore, Chapters 31 TAC 357.8 and 31 TAC 357.9 of the Texas Water Code specify that each regional water planning group throughout Texas shall make recommendations to identify which streams (all or parts), if any, can be classified as ecologically unique within the region along with determining unique sites for reservoir construction. This chapter presents the recommendations, made by the Region H Planning Group, referencing these chapters from the Texas Water Code.

The Region H Planning Group believes that stewardship of the environment can be coupled with water supply development. Successful planning and implementation of these recommendations will serve to enhance the quality of life and sustain the local economy throughout the water planning area.

8.2 Unique Stream Segments

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value within a planning region. The criteria codified in the Texas Administrative Code are as follows:

31 TAC § 357.8 Ecologically Unique River and Stream Segments

(a) Regional water planning groups may include in adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in subsection (b) of this section. The regional water planning group shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted regional water plan shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.

(b) A regional water planning group may recommend a river or stream segment as being of unique ecological value based upon the following criteria in accordance to TWDB guidelines:

(1) **Biological function** - stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;

(2) **Hydrologic function** - stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;

(3) **Riparian conservation areas** - stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;

(4) **High water quality/exceptional aquatic life/high aesthetic value** - stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

(5) **Threatened or endangered species/unique communities** - sites along streams where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species, and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

The significance of streams of unique ecological value is defined in the Texas Water Code, 16.051:

> *The legislature may designate a river or stream segment of unique ecological value. This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection.*

Texas Parks and Wildlife Department (TPWD) provided the Region H Water Planning Group with the document "*Ecologically Significant River and Stream Segments of Region H Regional Water Planning Area*" (Norris and Linam, October 1999) that detailed information on the impact to water resources in the region due to rapid population growth. As the population continues to grow water resources will become limited; therefore, identifying ecological unique is imperative. Several sources were used to identify the two hundred fifty-nine (259) river stream segments that exist within Region H boundaries. The methodology stated above was used to determine which of these water bodies should be classified as ecologically unique. TPWD selected twenty-nine (29) for inclusion as "ecologically significant" streams. This analysis served as the basis for further consideration of which streams might be of "unique ecological value." In 2003, TPWD updated their recommendations list, adding 2 streams. Members of the Region H Water Planning Group nominated two tributaries of Galveston Bay as unique due to high aesthetic value. Finally, the Houston Sierra Club submitted nominations for 18 stream segments within the Region, nine of which coincided with previously mentioned nominations.

The Region H Water Planning Group considered all 40 nominated stream segments, using the following described methodology to make a final selection.

Methodology:

(1) Screened 40 nominated streams based on data provided by Texas Parks and Wildlife Department and other sources (see *Table 8-1*) using a decision rule of selecting those streams with five or more criteria factors cited by the TPWD.

(2) Compared screened streams with previously studied reservoir sites and published or potential water conveyance plans and eliminated streams that might conflict with potential water development projects.

(3) Compared screened streams with TCEQ water rights and wastewater discharge information and identified streams that might raise water quality permitting issues.

(4) Compared screened streams with Bayou Preservation Association and Houston Canoe Club ranking of streams in the region and other recreational use information.

(5) Compared screened streams with riparian conservation areas and public lands, adding segments entirely within conservation areas and narrowing the recommendations to only those segments bordered by public lands.

Table 8-1

Streams Considered for Recommendation as Unique

River or Stream Segment	County	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality/ Aesthetic Value	Endangered/ Threatened Species	Conveyance Project/ Proposed Reservoir Site	Water Rights	WW Outfall	Recommended in the 2001 Plan
Considered in 2001 Regional Plan:										
Armand Bayou	Harris	x	xx	xx	x			x	xx	x
Austin Bayou	Brazoria	x	x	xx		xxx		xx		
Bastrop Bayou	Brazoria	x	x	xx		xxx		x		x
Big Creek	Fort Bend	x	x	xx	xx			x[1]	x	x
Big Creek	San Jacinto	x		xxx	x	x		R	x	x
Brazos River	Austin/Waller/Brazoria/Fort Bend	x	xxx	xxx		xx	x	xx	xx	
Caney Creek	Walker/ Harris	x	xx	xx					x[3]	
Carpenters Bayou	Harris	x	xx	x				x[1]	xx	
Cedar Lake Creek	Brazoria	x	xx	xx		xxxx		x[2]		x
Clear Creek	Waller	x	xx		x			R		
East Fork San Jacinto River	Walker/Harris/San Jacinto/Liberty/Montgomery	x	xx	xx	xxx				x[4]	
East Sandy Creek	Walker	x	x	x						
Halls Bayou	Brazoria	x	x			x				
Harmon Creek	Walker	x	xx	x	x			xx	x[5]	
Jones Creek	Brazoria	x	x	xx				x,x[1]		
Lake Creek	Montgomery	x	xx		xxx	x		R	x[6]	
Luce Bayou	Harris/Liberty	x	xx				x	x		
Menard Creek	Polk	x	xx	x		x		R		x
Mill Creek	Austin	x	xx		xx	x			xx[7]	
Nelson Creek	Walker	x	x		xx				x[8]	
Old River	Liberty	x	xx	x	x					
Oyster Bayou	Chambers	x	x	xx				xx		
Redfish Bayou	Brazoria		x	xx				x[1]	x	
San Bernard River	Brazoria/Fort Bend/Austin	x	xx			xx		xx	x[9]	
Upper Trinity River	Walker/Leon/Houston		x			x		xx		
Lower Trinity River	Chambers/Liberty	x	xxx	xxx		xx	E	xx	x[10]	
Upper Keechi Creek	Leon	x	x	x				x		
Wheelock Creek	Leon		x		x					
Winters Bayou	San Jacinto/Walker	x	xx	x	x					
Recommended by Houston Sierra Club (2005):										
Boswell Creek	Walker/San Jacinto	x	x	x	x	xx				
Briar Creek	Walker		x	x						
East Bay Bayou	Chambers		x	x				xx		
Henry Lake Branch	San Jacinto		x	x					x[8]	
Little Lake Creek	Montgomery/Walker		x	x						
Lost River	Chambers/Liberty	x	x	x						
Onion Bayou	Chambers	x	x	x				xx		
West Fork San Jacinto	Walker		x	x			x			
West Sandy Creek	Walker		x	x						
Recommened by RHWPG Members (2005):										
Lone Oak Bayou	Chambers	x	x		x					
Whites Bayou, below IH-10	Chambers/Liberty		x	x	x					

Note: More than one "x" in a criteria column indicates that the river or stream segment satisfies that particular criteria in more than one way. For example, Armand Bayou is a State Costal Preserve and is also a part of the Great Texas Coastal Birding Trail.

More than one"x" in the Water Rights or WW Outfall column mean more than one located on that stream.

1 Water right(s) held by TPWD
2 Water right held by US Fish & Wildlife
3 No outfalls north of State Hwy 105
4 One (1) at I-59 held by San Jacinto River Basin Forest Glen, Inc. WWTP
5 One (1) outfall for Gordon Glass Products
6 No outfalls north of State Hwy 105
7 Two (2) outfalls at State Hwy 36
8 Two (2) outfalls for TxDOT comfort stations
9 No outfalls between I-10 and Austin County Line
10 No outfalls in Chambers County, two (2) in Liberty County for City of Liberty WWTP and Derrigan Manufacturing
11 One (1) at Hwy 150
R - Rec permit w/o diversion
E - existing reservoir or impoundment

After consideration of the above factors, The Region H Water Planning Group recommended eight streams for designation as Streams of Unique Ecological Value in Region H. The recommended stream segments were designated by the Texas Legislature in 2007 as unique in Senate Bill 3, Section 4.02. In December 2009, the Sierra Club proposed four additional stream segments, shown in *Table 8-2*, to the Region H Water Planning Group for recommendation as unique. The adopted stream segments are discussed in more detail below and illustrated on *Figure 8-1*.

Table 8-2

Designated and Recommended Unique Stream Segments

Stream	County
Stream Segments Designated by Texas Legislature	
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Lake Creek	Brazoria
Menard Creek	Liberty, Hardin*, Polk
Oyster Bayou	Chambers
Stream Segments Recommended by Sierra Club for the 2011 Plan	
Caney Creek	Walker, Harris
Winters Bayou	San Jacinto, Walker
Little Lake Creek	Montgomery, Walker
West Fork San Jacinto	Walker
*Hardin County portion is in Region I	

The entire stream segment length was recommended for unique designation status for two of the streams: Armand Bayou and Menard Creek (segments within Region H.) For the remaining four streams, only those portions adjacent to or within the riparian conservation areas were proposed for designation as unique streams.

The following are descriptions of each of the unique stream segments designated by the Texas Legislature.

8.2.1 Armand Bayou[1]

Armand Bayou is a coastal tributary of Clear Lake, a secondary bay in the Galveston Bay System, in southern Harris County. The bayou is often shallow and has a mean width of 40 feet that supports varying flow over a muddy substrate. This scenic natural bayou and associated riparian forest offer habitat for alligators, waterfowl, and other wildlife such as raccoons, bobcats, and river otters. Noteworthy bird species known to inhabit the area include: pileated woodpeckers, red shouldered hawks, barred owls, ospreys, and migratory songbirds. Several hundred acres of restored coastal prairie offer habitat for grassland species such as the sedge wren and Le Conte's sparrow. The associated marshes that border the riparian forest provide valuable habitat to commercially and recreationally important species such as white shrimp, blue crabs, and red drum. In addition, the bayou also provides valuable recreational opportunities to local residents within an urban context.

[1] TPWD Report, Norris and Linam, October 1999.

The ecologically significant segment is from the confluence with Clear Lake in Harris County upstream to Genoa-Red Bluff Road in Harris County.

(1) Biological Function- significant riparian zone and associated marshes display significant overall habitat value.

(2) Hydrologic Function- performs valuable hydrologic function relating to flood attenuation for the Pasadena and Clear Lake areas.

(3) Riparian Conservation Area- fringed by the Armand Bayou Coastal Preserve and is a part of the Great Texas Coastal Birding Trail.

(4) High Water Quality/Exceptional Aquatic Life/High Aesthetic Value- high aesthetic value for outdoor recreation within an urban context.

(5) Threatened or Endangered Species/Unique Communities- none identified.

8.2.2 Austin Bayou[2]

Austin Bayou is a scenic coastal plain bayou fringed by native prairie, agricultural land, and woodlands. It begins near Rosharon in north central Brazoria County and flows southeasterly 26 miles into Bastrop Bay. The bayou is narrow (about 25 feet wide) with a limited flow of water and provides valuable habitat for wildlife, and is a recreational resource to local residents. The bayou and associated coastal marsh offer significant habitat for wading birds such as the wood stork, reddish egret and white-faced ibis. Other known inhabitants include white-tailed kites, white-tailed hawks, waterfowl (geese and sandhill cranes), and grassland species (sedge wren, Le Conte's sparrow, and grasshopper sparrow). The ecologically unique segment is that portion of the stream within the Brazoria National Wildlife Refuge (from the confluence with Bastrop Bayou to FM 2004).

(1) Biological Function- coastal stream fringed with native prairie and woodlands that display significant overall habitat value.

(2) Riparian Conservation Area- fringed by the Brazoria National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.

(3) Threatened or Endangered Species/Unique Communities- designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, provides habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.3 Bastrop Bayou[3]

Bastrop Bayou is a scenic coastal waterway fringed by extensive freshwater wetland habitat. The bayou rises in the central part of Brazoria County and flows deeply in a southeasterly direction for 13 miles where it empties into Austin Bayou and ultimately Bastrop Bay. Like Austin Bayou, Bastrop Bayou provides valuable habitat for endangered or threatened shorebirds as well as waterfowl, grassland species, and birds of prey. These include geese, sandhill cranes, sedge wrens, grasshopper sparrows, white-tailed kites, and white-tailed hawks. In addition to numerous bird watching opportunities, the bayou also provides outdoor opportunities in the form of water related activities to local residents. The ecologically significant segment is that portion within the Brazoria National Wildlife Refuge. This segment is within TCEQ stream segment 1105.

[2] TPWD Report, Norris and Linam, October 1999.
[3] TPWD Report, Norris and Linam, October 1999.

(1) Biological Function- extensive freshwater wetland habitat that displays significant overall habitat value.

(2) Hydrologic Function- extensive freshwater wetlands perform valuable hydrologic function relating to water quality.

(3) Riparian Conservation Area- fringed by the Brazoria National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.

(4) Threatened or Endangered Species/Unique Communities- designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, provides habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.4 Big Creek (Fort Bend)[4]

Big Creek begins south of Rosenberg and flows southeasterly 25 miles into the Brazos River in Fort Bend County. The creek is an old Brazos River channel with associated sloughs, bayous, oxbow lakes, and coastal prairies that are bordered by bottomland hardwood forest. This habitat provides an excellent opportunity for bird watching, as over 270 species of birds have been sighted in this area. Birds commonly seen here include purple gallinules, least bitterns, prothonotary warblers, barred owls, white-ibis', herons, and egrets among others. Other wildlife that inhabits the area includes alligators, bobcats, raccoons, feral hogs, and gray foxes. The ecologically significant segment is that portion of the stream within the Brazos Bend State Park.

(1) Hydrologic Function- bottomland hardwood forest and associated wetlands perform valuable hydrologic function relating to water quality.

(2) Riparian Conservation Area- fringed by Brazos Bend State Park and is part of the Great Texas Coastal Birding Trail.

(3) High Water Quality/Exceptional Aquatic Life/High Aesthetic Value- designated as an Ecoregion Reference Stream by the TPWD River Studies Program for high dissolved oxygen and diversity of benthic macroinvertebrates.

(4) Threatened or Endangered Species/Unique Communities- none identified.

8.2.5 Big Creek (San Jacinto)[5]

Big Creek rises near Cold Springs in central San Jacinto County and flows southeasterly into northern Liberty County where it joins the Trinity River. The creek is narrow with a sandy bottom, follows a run, riffle, pool sequence, and contains abundant woody debris. This provides habitat for a diverse community of fish and macroinvertebrates including the southern brook lamprey, blacktail shiner, blacktail redhorse, blackstripe topminnow, numerous perch species, and several species of sunfish. The creek meanders through pristine forestland in the Sam Houston National Forest and provides significant opportunities for bird watching and outdoor recreation. Bird species often found include Louisiana waterthrushes and worm-eating warblers, as well as the endangered red-cockaded woodpecker around which the National Forest Service developed an interpretive site. An interpretive trail through the Big Creek Scenic Area and the Lone Star Hiking Trail provide access to the creek and provide an opportunity to see mammals such as bobcats, squirrels, and beavers. The ecologically significant segment is that portion of the stream that exists within the Sam Houston National Forest within San Jacinto County.

[4] TPWD Report, Norris and Linam, October 1999.
[5] TPWD Report, Norris and Linam, October 1999.

(1) Biological Function- displays significant overall habitat value considering the high degree of biodiversity.

(2) Riparian Conservation Area- fringed by the Sam Houston National Forest and the Big Creek Scenic Area and is part of the Great Texas Coastal Birding Trail.

(3) High Water Quality/Exceptional Aquatic Life/High Aesthetic Value- exceptional aesthetic value.

(4) Threatened or Endangered Species/Unique Communities- red-cockaded woodpecker group nearby.

8.2.6 Cedar Lake Creek[6]

Cedar Lake Creek begins in northwest Brazoria County and flows southeasterly 28 miles into Cedar Lake and ultimately to the Gulf of Mexico. The creek is bordered by bottomland hardwood forest in the northern portion and by interspersed native prairies, farmland, and coastal marshes in the south. It is one of the few remaining unchannelized bayous in the region. The creek itself and the adjacent San Bernard National Wildlife Refuge provide habitat to numerous bird species including the scissor-tailed flycatcher and numerous shorebirds. The ecologically significant segments are those portions of the stream adjacent to the proposed Wildlife Management Area and the San Bernard Wildlife Refuge within Brazoria County.

(1) Biological Function- undredged bayou with extensive forest and wetlands that display significant overall habitat value.

(2) Hydrologic Function- bottomland forest and wetlands perform valuable hydrologic functions relating to flood attenuation and water quality.

(3) Riparian Conservation Area- fringed by San Bernard National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.

(4) Threatened or Endangered Species/Unique Communities- significant due to presence of reddish egret, wood stork and white-faced ibis.

8.2.7 Menard Creek[7]

Menard Creek begins east of Livingston in central Polk County and flows southeasterly to the Polk County line, where it turns northwesterly and flows through Liberty County into the Trinity River. The creek channel is narrow and shallow with a sandy bottom and follows a sinuous path through banks lined with pine and hardwood forest. The ecologically significant segment is from the confluence with the Trinity River near the Polk/Liberty County line upstream to its headwaters located east of Livingston in the central part of Polk County. The portion that runs through Hardin County is not included in the segment as it is outside Region H.

(1) Biological Function- bottomland hardwood forest that displays significant overall habitat value.

(2) Hydrologic Function- performs valuable hydrologic functions relating to water quality and groundwater recharge of the Chicot Aquifer.

(3) Riparian Conservation Area- fringed by the Big Thicket National Preserve.

---

[6] TPWD Report, Norris and Linam, October 1999.
[7] TPWD Report, Norris and Linam, October 1999.

(4) Threatened or Endangered Species/Unique Communities- high diversity of freshwater mussels, many of which are rare.

8.2.8 Oyster Bayou[8]

Oyster Bayou, Chambers County: The segment within the Anahuac National Wildlife Refuge provides freshwater inflow to the coastal marsh. Wetland habitats provide important wintering and migration stopover habitat for migratory birds including Central Flyway waterfowl, shorebirds, wading birds and marsh and waterbirds. Upland habitats including prairie and woodlands are important to many neotropical/nearctic and temperate landbirds, including several sensitive/declining species. The mottled duck is an important resident waterfowl species for which the refuge provides habitat year-round for nesting, brood-rearing, molting and wintering. Coastal marshes serve as nursery areas for many important commercial and recreational fish and shellfish species including white and brown shrimp, blue crab, red drum, flounder and speckled sea trout. The ecologically significant segment is that portion of the stream within the Anahuac National Wildlife Refuge.

(1) Biological Function- Provides nursery for commercial and recreational fisheries.

(2) Hydrologic Function- Provides sediment removal above East Bay.

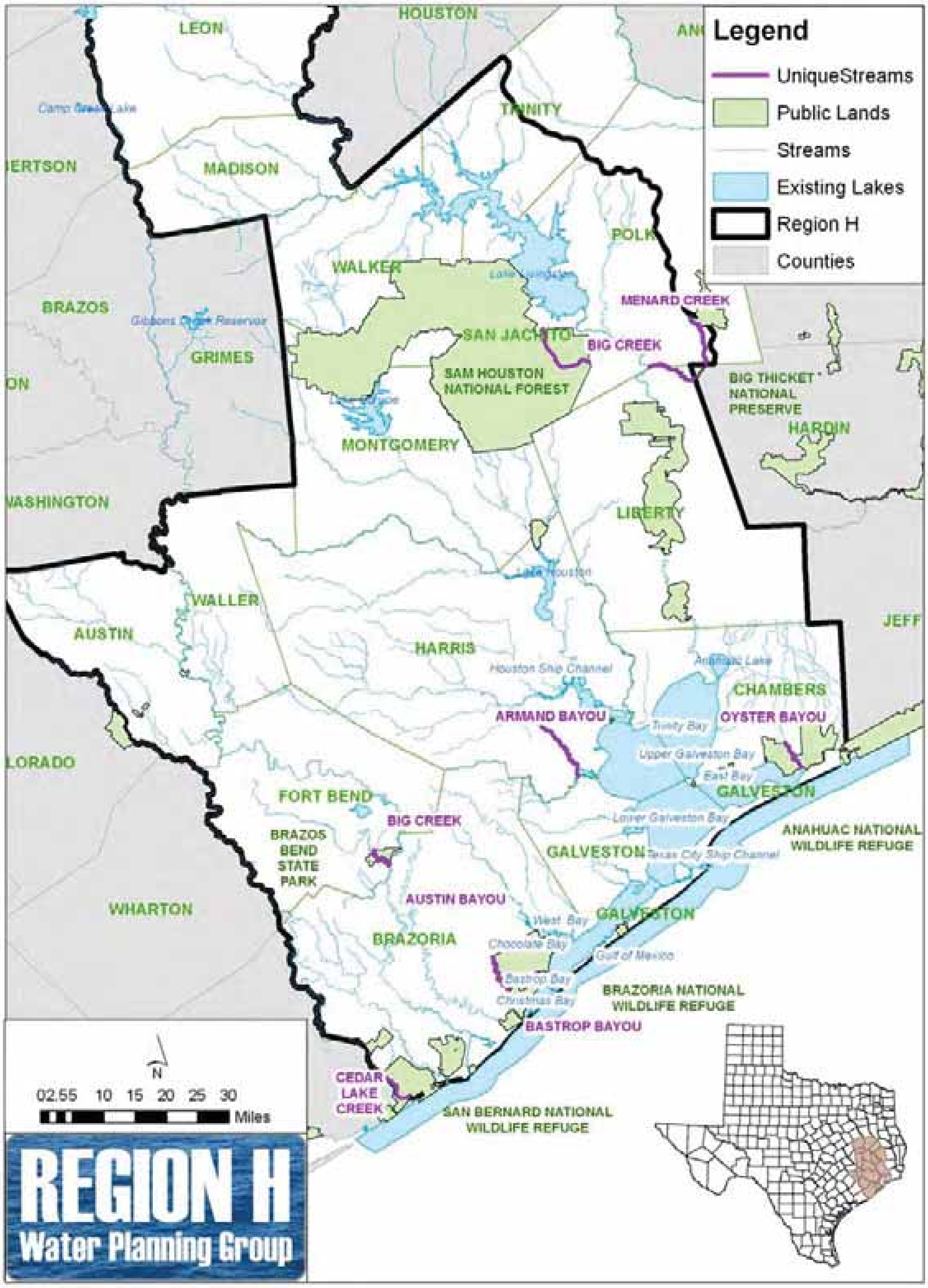
(3) Riparian Conservation Area- part of the Anahuac National Wildlife Refuge.

(4) Threatened or Endangered Species/Unique Communities- and piping plover habitat within the Anahuac NWR.

[8] TPWD, Texas Gulf Ecological Management Sites, Anahuac NWR data page, accessed at www.tpwd.state.tx.us/texaswater/txgems/anahuac/anahuac.phtml

Figure 8-1

Recommended Unique Stream Segments



8.3 Unique Reservoir Sites

According to the 2007 State Water Plan, Texas has 196 major reservoirs, and more than half of Texas' surface water is from reservoirs. A major reservoir is defined as a storage capacity of more than 5,000 acre feet. Water management strategies need to put to place to protect the supply of these exiting reservoirs; therefore, evaluations were conducted to identify unique reservoir sites.

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs within a planning region. The following criteria are outlined within the Texas Water Code.

31 TAC § 357.9 Unique Sites for Reservoir Construction

A regional water-planning group may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The following criteria shall be used to determine if a site is unique for reservoir construction:

1. Site-specific reservoir development is recommended as a specific Water Management Strategy or in an alternative long-term scenario in an adopted regional water plan; or

2. The location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics, or other pertinent factors make the site uniquely suited for:

    A. Reservoir development to provide water supply for the current planning period; or

    B. Where it might reasonably be needed to meet needs beyond the 50-year planning period.

The significance of sites of unique value for reservoir construction is defined in the Texas Water Code, 16.051:

> The legislature may designate a site of unique value for the construction of a reservoir. A state agency or political subdivision of the state may not obtain a fee title or an easement that would significantly prevent the construction of a reservoir on a site designated by the legislature under this subsection.

In July 2008, the Texas Water Development Board provided the *Reservoir Site Protection Study* that recommended proposed reservoir project sites to be designated as unique reservoir sites under legislature. The board identified 220 major reservoir sites in Texas that were previously included in previous studies to be screened. TWDB used the screening process stated above in the Texas Water Code for all the reservoirs. After technical evaluations, the 16 top ranked reservoirs (14 major and 2 minor reservoirs) were selected to be recommended as a unique reservoir. Among this list, four sites reside within the Region H boundaries, which are Bedias Reservoir, Allens Creek Reservoir, Little River Reservoir and Little River Off-channel Reservoir. These four reservoir sites were listed in the 2007 State Water Plan. Bedias Reservoir, Little River and Little River Off-channel were classified as unique reservoir sites by the 80th Texas Legislature; Allens Creek was previously designated as unique. However, Bedias Reservoir was the only site listed in both the 2007 *Reservoir Site Protection Study* and the 2007 State Water Plan/80th Texas Legislature as a recommended reservoir site.

The Region H Water Planning Group recommended five surface water reservoir projects in the 2011 Region H Plan. These include Allens Creek, the GCWA Off-channel Reservoir, the Dow Off-channel Reservoir, the Brazoria County Off-channel Reservoir and the Fort Bend County Off-channel

Reservoir. These projects are recommended Water Management Strategies. Water supply from each project is needed to meet water needs within the current 50-year planning period. In the previous 2006 study, Allens Creek and Little River Off-channel Reservoirs were selected by the Region H Water Planning Group. In the 2001 Regional Water Plan, two additional reservoir projects were recommended (Bedias Creek Reservoir and Little River On-channel Reservoir). The projects may be considered in future planning cycles but are not included in the 2011 Plan as recommended or alternative strategies. Of the four current designated unique reservoir project sites, only one (Allens Creek) is included in the 2011 Region H Plan as a recommended strategy. The Little River Off-channel Reservoir, Bedias Creek Reservoir and the Little River Reservoir sites were designated by the Legislature as unique in Senate Bill 3, but are not included in the 2011 Plan update as recommended management strategies. However, the Little River Off-channel Reservoir is included as an alternative water management strategy in the 2011 Region H Plan.

In December 2009, Montgomery County proposed two additional reservoir sites for the Region H Water Planning Group's consideration for recommendation as unique reservoir sites. The two reservoirs listed below were proposed as a potential future surface water supply source for Montgomery County.

- Sam Houston Lake – located partially in the Sam Houston National Forest on Little Lake Creek;
- Lone Star Lake – located on Lake Creek west of Montgomery, Texas.

The Region H Water Planning Group continues to support the designation of Allens Creek, Little River Off-channel, Bedias Reservoir and Little River Reservoir as unique reservoir sites. The RHWPG also considered Millican Reservoir, located on the Navasota River, as a Water Management Strategy and considered recommending that the legislature designate the site as unique. Due to public opposition, the RHWPG withdrew the Millican Reservoir from the 2011 Plan as a Water Management Strategy and as a site for unique designation. However, the RHWPG recognized that a reservoir on the Navasota River may be a potential strategy for consideration in future planning cycles. The four reservoir sites previously designated by the Texas Legislature are illustrated on *Figure 8-2*. The reservoir sites are described below:

8.3.1 Allens Creek Reservoir

This site is located in Austin County, one mile north of the City of Wallis, on Allens Creek, a tributary to the Brazos River. This site exists within the Brazos River Basin and is in Region H. Approximately 7,000 acres would be inundated. This project is configured as a scalping reservoir that would divert stormwater flows (periods of high water) from the Brazos River and impound these flows in the reservoir to create storage yield. During periods of median to low flows, diversions are limited by instream flow thresholds established to protect the environment and down-stream water rights. The maximum dam height is 53 feet. The conservation storage quantity is approximately 145,500 acre-feet at an elevation of 121 feet msl. The projected firm yield of this project is 99,650 acre-feet per year. The total project cost is estimated at $222,752,400. The Brazos River Authority and City of Houston will jointly develop this reservoir project for their water users within the lower Brazos and San Jacinto river basins.

8.3.2 Little River Off-Channel Reservoir

This site is located in Milam County, approximately five miles northeast of the City of Milano, on Beaver Creek, a tributary of Little River. This site exists within the Brazos River Basin and is in Region G. Approximately 4,350 acres would be inundated. Allens Creek is configured as a scalping reservoir that would divert stormwater flows during periods of high water from Little River and impound the flows to create storage yield. The maximum dam height is approximately 120 feet. The conservation storage quantity is approximately 155,812 acre-feet at an elevation of 260 feet msl. The projected firm yield of this project is 40,000 acre-feet per year, when operated as part of the BRA reservoir system. The total project cost is estimated as $137,356,000. The Brazos River Authority will develop this reservoir project for their water users within the lower Brazos river basin.

8.3.3 Bedias Reservoir

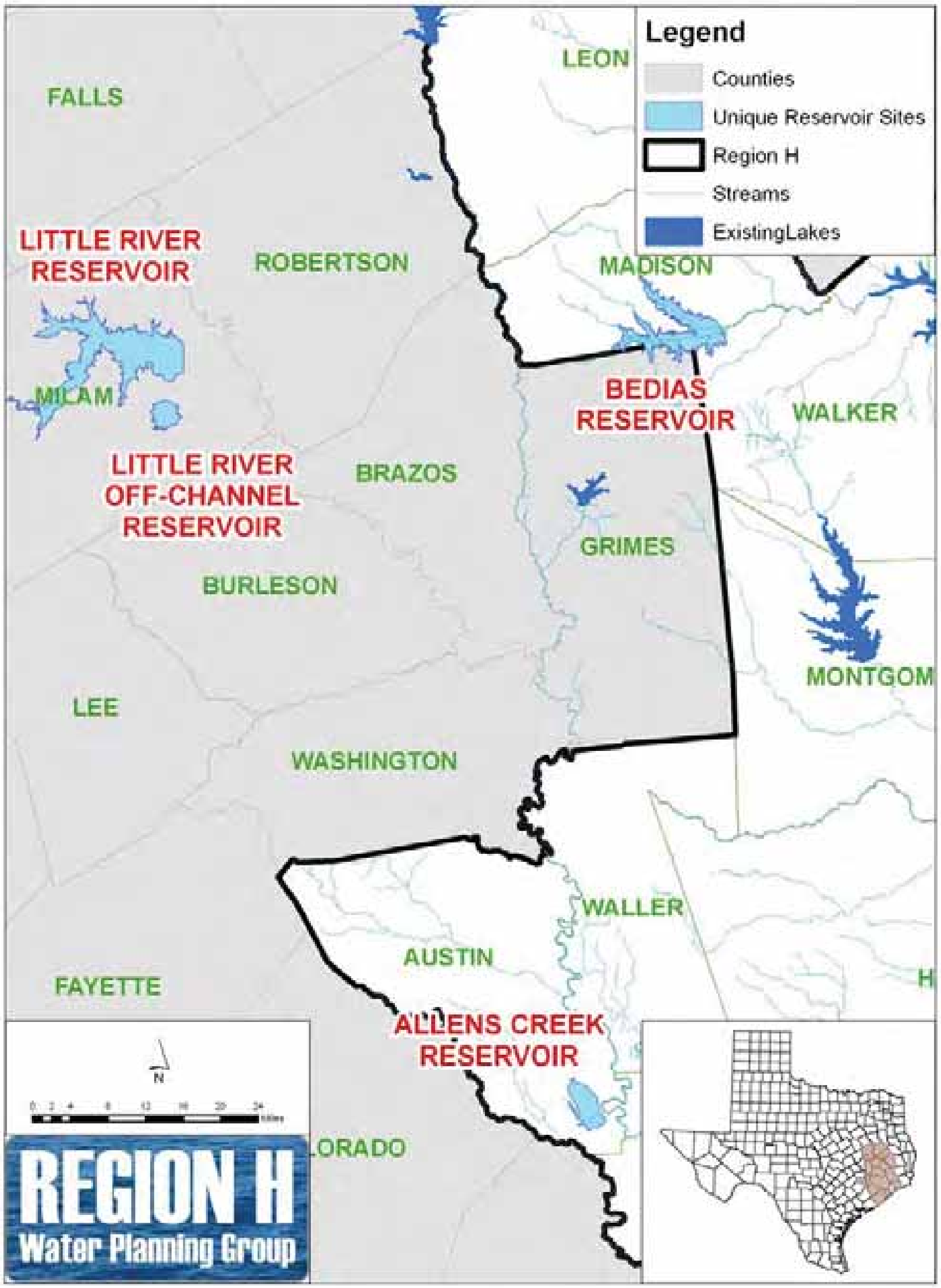
This site is at the junction of Grimes, Madison and Walker Counties, located principally within Madison County about 3.5 miles west of Highway 75. The site includes Bedias and Caney Creeks. This site exists within the Trinity River Basin and is in Regions G and H. The upstream drainage area is approximately 395 square miles. The dam is proposed with a maximum height of 45 feet and a normal pool elevation of 230 feet msl. The reservoir would have conservation storage of 181,000 acre-feet and would inundate approximately 10,000 acres. The approximate firm yield of Bedias Reservoir is 75,430 acre-feet per year. The estimated project cost is $247,241,628. This project is currently included in the TRA Trinity River Basin Master Plan. If needed, the Trinity River Authority and the San Jacinto River Authority would jointly develop this project for their water users within the lower Trinity and San Jacinto river basins, respectively.

8.3.4 Little River Reservoir

This site is located on the main stem of the Little River just upstream from its confluence with the Brazos River. It is near the City of Cameron in Milam County, and is located within the Brazos River basin within Region G. The site would have a surface area of 35,000 acres and a storage volume of about 930,000 acre-feet. The approximately 7,500 square mile upstream drainage area is uncontrolled which produces a significant yield. The fully developed site would have a firm yield of about 129,000 acre-feet per year. The approximate project cost is approximately $556,520,000. If needed, the Brazos River Authority and the Gulf Coast Water Authority propose this project for joint development for their water customers within the Brazos and the San Jacinto-Brazos river basins.

Figure 8-2

Recommended Reservoir Sites



8.4 Regulatory, Administrative and Legislative Recommendations

Section 357.7(a)(10) of the Texas Water Development Board regional water planning guidelines requires that a regional water plan include recommendations for regulatory, administrative, and legislative changes:

"357.7(a) Regional water plan development shall include the following…

(10) regulatory, administrative, or legislative recommendations that the regional water planning group believes are needed and desirable to: facilitate the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the state and regional water planning area. The regional water planning group may develop information as to the potential impact once proposed changes in law are enacted."

These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed towards the Texas Commission on Environmental Quality (TCEQ), that administrative recommendations are directed towards the Texas Water Development Board (TWDB), and that legislative recommendations are directed towards the State of Texas Legislature (Legislature.)

8.4.1 Summary of Recommendations

The Region H Water Planning Group has adopted the following regulatory, administrative, and legislative recommendations. They are discussed in detail in the following sections.

Regulatory and Administrative Recommendations

- Clarify the agency rules to address consistency with the regional water plans.
- Clarify agency rules on quantitative environmental analysis.
- Modify the rules for wastewater permitting so that reclamation facilities are assessed in conjunction with their source water facilities.

Legislative Recommendations

- Remove barriers to interbasin transfers of water.
- Increase funding for the Bays and Estuaries programs of state resource agencies and for additional monitoring and research to scientifically determine freshwater inflow needs.
- Maintain the current rule of capture basis of groundwater law within Texas in all areas not subject to defined groundwater conservation districts.
- Support development of Groundwater Conservation Districts to protect current groundwater users, and encourage these districts to study and manage aquifer storage and recovery.
- Establish financing mechanisms for development of new water supply projects identified within the adopted regional water plans.
- Continue funding of the State of Texas Groundwater Availability Modeling effort.

- Establish funding for agricultural research into the area of efficient irrigation practices.
- Implement the programs recommended by the Water Conservation Implementation Task Force.
- Establish funding for research in advanced conservation technologies.
- Resolve the issues related to water rights permitting for indirect reuse, and advocate water reuse statewide.
- Establish flood damage liability limits for water supply reservoirs.
- Direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.
- Continue funding of the Regional Water Planning process.

Recommendations Specific to Infrastructure Financing

- The State Participation Program will be the most important financing program for water supply projects sized to meet projected long-term demands. Increase the funding of this program as needed to allow development of these water supply projects.
- The State Revolving Fund Programs will remain important to assist some systems in meeting minimum drinking water standards. As infrastructure ages and water quality standards increase, the demand for this assistance will grow. Increase the funding of this program in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.
- The State Loan Program for political subdivisions and water supply corporations offers loans at a cost advantage over many commercial and many public funding options. Some entities will benefit from these loans as they convert from groundwater to surface water supplies. Increase funding of this program to allow financing of near-term infrastructure cost projections.
- Irrigation conservation is an important part of the Region H Water Plan. Individual irrigators will require assistance in upgrading their irrigation systems to increase water efficiency. Provide a mechanism to leverage Federal grant programs by providing the local matching share. Increase funding of the Agricultural Water Conservation loan program, and consider adding a one-time grant or subsidy program to stimulate early adoption of conservation practices by individual irrigators.
- Continue State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.
- The Regional Water Supply and Wastewater Facilities Planning Program assists political subdivisions with planning grants, allowing small communities to pursue cost-efficient regional solutions. Increase funding of this program in anticipation of upcoming development throughout the state, and expand the program to include the costs for preliminary engineering design and development of detailed engineering cost estimates of recommended facilities.
- The USDA Rural Utilities Service offers Water and Waste Disposal Loans and Grants to rural areas and towns of up to 10,000 people. Certain communities within Texas are specifically

targeted for these grants. Support continued and increased funding of this program at the Federal level, and fund the state Rural Water Assistance Fund.

- Desalination is becoming an attractive management strategy to regions of the State, including Region H, but it is not yet cost-competitive with more traditional water supply projects. Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs.

- Irrigators cannot generally afford the increased cost of water when new supplies are developed. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming. Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.

- The US Army Corps of Engineers (USACE) constructs civil works projects for flood control, navigation and ecosystem restoration. USACE participation in water supply projects is limited by current regulations. Support regulatory changes that will allow USACE to increase water supply storage in new reservoirs that they construct and manage, and investigate other alternatives for increased involvement of USACE in funding water supply projects.

- The costs to water users can be reduced if optimally sized regional facilities can be constructed instead of multiple small systems. Several options for forming agreements between political subdivisions exist. Region H supports the forming of regional facilities and encourages the State to remove any impediments to these entities, including restrictions to the use of public/private partnerships. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

8.4.2 Regulatory and Administrative Recommendations

Consistency with the Regional Water Plans

Discussion: Water rights applications must be consistent with the Regional Water Plans in order to be approved. The TCEQ has interpreted this to mean that the requested water right must be directly linked to a recommended water management strategy; otherwise, the applicant has had to petition the Regional Water Planning Group (RWPG) for a plan amendment to add their permit application. RWPGs should not be required to formally adopt or amend the regional plan to include a proposed management strategy for water supply in order for new water rights applications to be evaluated by the TCEQ. This creates a situation that can deter the study of viable alternatives by agencies outside the RWPG and may ultimately block their ability to obtain permits for new supplies that the agencies need to meet their future demands. These alternatives may be preferable to existing management strategies (such as building reservoirs) that were previously recommended by the RWPG. A water right application that is not in conflict with the regional water plan (i.e., does not compete for supply allocated in the plan) should be considered consistent with the plan by the TWDB and TCEQ. If the strategy would benefit the region, it could then be added to the plan as a formal management strategy in the next five-year update, undergoing the full analysis, consideration, and Public Hearing process.

Recommendation: The Region H Water Planning Group recommends that the Agency rules be amended to clarify the consistency requirement. Only those water rights applications in conflict with the current regional water plan should be referred to the RWPG for amendment.

Quantitative Environmental Analysis

Discussion: The Regional Water Planning Guidelines require that the evaluation of potentially feasible water management strategies include a quantitative analysis of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico (31TAC357.7.(a)(8)(A)). The TWDB has provided detailed guidance on specific study methods to be used in determining population, water demand, socioeconomic impacts and yield from current and proposed supply sources, but it has not provided similar guidance in the area of environmental impacts. This lack of specificity is resulting in different methods being used in different regions. Additionally, it places the planning groups at risk of needing to conduct additional analysis after state agencies review the Initially Prepared Plans, and add those results to the report after the public review period has closed.

Policy Recommendation: The Region H Water Planning Group recommends that the TWDB determines, in conjunction with the TCEQ and TPWD, which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, the guidance should be added to the Planning Guidelines, so that RWPGs can reflect the cost of those requirements in their budgets and scopes of work. Adding environmental guidelines will also make water plans consistent across the State.

TPDES Permitting of Wastewater Reclamation Facilities

Discussion: Existing Texas Pollutant Discharge Elimination System (TPDES) permit requirements do not encourage, and in fact discourage, wastewater reuse and reclamation. This recommendation relates solely to issues in the TPDES permitting process and not rules directly applicable to the use of reuse and reclaimed water outlined in TCEQ Section 210. Authorization of reclaimed water use may require a new or amended permit when the treatment results in a discharge of wastewater into waters within the state. This effectively double-counts the waste load from a facility and could potentially provide a regulatory obstacle for some wastewater reuse projects.

In terms of wastewater reuse (e.g., without further treatment), a violation of an end-user's discharge permit could be caused by using effluent to replace or supplement another water source. An example would be an industry, whose discharge is close to its permitted limit for a given constituent, exceeding that limit by virtue of its use of effluent from a separate wastewater treatment plant.

In terms of wastewater reclamation (e.g., with further treatment), permitting the discharge from a wastewater reclamation facility could be difficult and unnecessarily expensive in certain cases. Wastewater reclamation often entails advanced treatment of wastewater discharged from one or more treatment facilities for industrial use. If this advanced treatment facility is separate, it may require a separate TPDES permit. Under current TCEQ rules for consolidated permits, discharges from a new facility are considered as occurring *in addition to* all currently permitted discharges for the purpose of assessing the collective effect on the receiving stream. While this is the correct procedure for evaluating a discharge from a new waste source, it effectively double-counts the waste load from a reclamation facility; once at the original plant, and again at the additional treatment facility. Designing a reclamation facility to sufficiently mitigate this double-counting is unneeded and may be cost-prohibitive. In actuality, the waste load should be divided between the applicable facilities depending upon the reuse and reclamation demands.

Therefore, the permitting process should be modified to address both reuse and reclamation projects that draw effluent from existing wastewater plants, so that daily loads may be accurately assessed on a combined maximum daily load and maximum daily concentration basis. Wastewater plants should be permitted accordingly.

Policy Recommendation: The Region H Water Planning Group recommends that the TCEQ clarify the TPDES rules for wastewater permitting so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities. This will eliminate double-counting of waste loads and remove a potential obstacle for some wastewater reuse projects in the State.

8.4.3 Legislative Recommendations

Interbasin Transfers

Discussion: Senate Bill One states that water rights developed as a result of an interbasin transfer become junior to other water rights granted before the interbasin transfer permit. Senate Bill One made obtaining a permit for interbasin transfer significantly more problematic than it was under prior law and thus, it discouraged the use of interbasin transfers for water supply. This is undesirable for several reasons.

First, current supplies greatly exceed projected demands in some basins, and the supplies already developed in those basins can only be used via interbasin transfers (e.g. Trinity Basin within Region H).

Second, interbasin transfers have been used extensively in Texas and are an important part of the state's current water supply. For example, three of the five Region H Major Water Providers (City of Houston, Trinity River Authority and San Jacinto River Authority) maintain current permits for interbasin transfers collectively of over 1,000,000 acre-feet per year. Virtually all future water demands within the San Jacinto basin (Harris County in particular) of Region H must rely on interbasin transfers.

Third, emerging regional water supply plans for major metropolitan areas in Texas (Dallas-Fort Worth and San Antonio) rely on interbasin transfers as a key component of their plans. It is difficult to envision developing a water supply for these areas without significant new interbasin transfers.

Policy Recommendation: The Region H Water Planning Group recommends that the legislature revise the current law on interbasin transfers and remove the unnecessary and counterproductive barriers to such transfers that now exist.

Texas Bays and Estuaries Program Funding

Discussion: The RHWPG has adopted specific language associated with establishment of freshwater inflows to maintain the health and productivity of the bay. Galveston Bay is an important economic and recreational resource for our region. Currently, TWDB and TPWD are working on modeling and development of flow recommendations for minor estuaries. Review of the Galveston Bay freshwater inflow study began in 2007 with the TPWD, TCEQ and interested stakeholders. However, the current levels of funding within the State of Texas Bay & Estuary program are insufficient to continue the needed monitoring, study, and development of management strategies for the bay.

Policy Recommendation: The Region H Water Planning Group recommends establishment of additional funding to pursue necessary future efforts of the Galveston Bay & Estuary program.

Rule of Capture

Discussion: Groundwater is a vital resource within Region H. This is especially true within the rural counties of the region that are predominantly dependent on groundwater. Current groundwater law based on the Rule-of-Capture has facilitated orderly development of groundwater systems throughout the State of Texas and, barred the intrusion of private interests, and it could continue to serve the water usage interests throughout the state. It appears that the Rule-of-Capture could continue per the status quo to serve the groundwater interests within the region.

Policy Recommendation: The Region H Water Planning Group supports continued usage of the Rule-of-Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts.

Groundwater Conservation Districts

Discussion: Region H communities, particularly those within the rural areas of the region, are dependent on groundwater supplies. Groundwater is a very valuable resource to this region. Region H contains counties, specifically Austin, Leon and Madison, where some municipalities, water supply corporations and property owners believe Groundwater Conservation Districts (GCD) are needed to retain long-term groundwater supplies within their respective counties. Region H also has several counties, including Brazoria, Waller and Montgomery, where groundwater supplies will, in theory, reach their maximum sustainable yield due solely to projected in-county water usage rates. A GCD is a potential vehicle for these counties to manage and protect groundwater supplies from over-development within each respective county. Senate Bill 2 of the 77th Legislature authorized the formation of four new GCDs in Region H (Bluebonnet, Brazoria County, Lone Star and Mid-East Texas) to manage and protect groundwater resources.

Policy Recommendation: The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.

Water Supply Project Financing Mechanism

Discussion: The Region H Regional Water Plan includes development of several surface water reservoirs and other supply projects. The capital cost to develop these projects is significantly higher than the historic cost of water supply projects. The high projected costs dissuade local communities from making a financial commitment to support future projects. These financing issues will delay the implementation of needed projects.

The 80th Texas Legislature (2007) appropriated funding to enable issuance of $440 million in bonds for the Water Infrastructure Fund (WIF) to fund water plan projects. The program is designed with a maximum repayment period of 20 years, which may not be adequate for financing larger projects such as surface water reservoirs. Instead this recommendation is requesting that the State Participation Program funding be increased as needed to fund long term supply projects. This program enables the Water Development Board to assume a temporary ownership interest in a regional project when the local sponsors are unable to assume debt for an optimally sized facility. Payments on the funds provided by the State are deferred until a customer base grows into the capacity it funded. The deferred interest payments do not accrue additional interest. By funding up to 50% of a project, the program helps the local sponsors optimize facility size and avoid later expansions and replacements.

Policy Recommendation: To address this situation, the Region H Water Planning Group supports establishment of financing methods by the State of Texas to capitalize a fund to support development of water supply projects recommended within adopted RWPs.

Groundwater Availability Modeling Funding

Discussion: Many areas of Region H are totally dependent on groundwater to support the long-term viability of these areas. The current Groundwater Availability Modeling (GAM) effort is supported since it is the most comprehensive groundwater assessment and analysis effort of the previous 20 years. The current GAMs effort, however, is omitting minor aquifers and other groundwater considerations that are vital for certain local communities.

Policy Recommendation: The Region H Water Planning Group supports continued funding for the GAMs effort and recommends comprehensive analysis of all groundwater resources within the state.

Agricultural and Irrigation Conservation Funding

Discussion: The Region H water management plan includes a number of irrigation conservation based water management strategies. It is apparent that adoption of irrigation conservation practices may benefit the irrigation and agricultural industry in addition to local communities that may take advantage of water supply savings resulting from irrigation conservation. Additionally, the RHWPG supports further research and development of water-efficient and drought-resistant crop and species.

Policy Recommendation: The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.

Water Conservation

Discussion: The RHWPG strongly supports water conservation at all levels. The RHWPG has incorporated water conservation in the regional water plan as a management strategy. However, realizing advanced conservation savings in municipal county-other areas may be difficult, as these practices require some management, funding and oversight. While the RHWPG does not advocate a one-size-fits-all conservation program for the State of Texas, they recommend that the legislature address water conservation and provide some guidance and ability for county and local governments to implement these programs. The 78th Legislature appointed a Water Conservation Task Force to study water conservation policies and best management practices, and to report their results to the 79th Legislature in 2005. The 80th Legislature passed Senate Bill 3 creating a Water Conservation Advisory Council consisting of 23 members to provide a resource with expertise in water conservation.

Policy Recommendation: Region H Water Planning Group supports water conservation and recommends that the legislature continue to address and improve water conservation activities in the state.

Water Conservation Research Funding

Discussion: The Water Conservation Implementation Task Force identified numerous best management practices in TWDB Report 362 – Water Conservation Best Management Practices Guide. The Best Management Practices outlined in the report were developed using information compiled from past research and studies along with information provided by the task force members. Additional water-saving technologies may still be developed in the future.

Policy Recommendation: The Region H Water Planning Group recommends that the State fund research into advanced conservation technologies.

Wastewater Reuse

Discussion: The TCEQ water rights permitting process for wastewater reuse needs to be clarified. Conflicts exist between Texas Water Code Sections 11.042 and 11.046 regarding the permitting of indirect reuse water. Section 11.042(c) states that return flows, once introduced to the stream, are property of the State of Texas and are therefore subject to appropriation by others. However, Section 11.046(b) and (c) allow the owner of return flows to obtain a bed-and-banks permit to transport this water to a place of reuse. This leads to potential conflicts between downstream appropriators and those who wish to indirectly reuse effluent.

Furthermore, the TCEQ has issued some water rights permits based on the existence of return flows in the river, and in the adjudication process, some claims were established based on return flows. Additionally, some bed and banks permits were issued with priority dates while others were issued without priority dates. Because of these issues and the conflicts discussed above, it is difficult to analyze indirect reuse as a water management strategy. Due to these significant unanswered, outstanding questions, the benefits and yields from reuse projects cannot be accurately estimated under the current regulatory environment. Specific regulatory issues that need to be resolved or clarified are outlined below:

1. A policy for establishing a priority date, if any, for an indirect reuse authorization (i.e., bed-and-banks authorization) should be developed.

2. Conflicts between Texas Water Codes 11.042 and 11.046 relating to the ownership of return flows (water right holders, groundwater users, and the State) need to be resolved.

3. A policy for establishing the method and technical approach for evaluating indirect reuse permits (i.e., “no injury” analysis, WAM Run 3, WAM Run 8, etc.) needs to be developed.

4. Clarification regarding the ownership of return flows and the right to permit return flows for indirect reuse needs to be provided. The issue of third-party permitting of return flows needs additional clarification.

5. Additional clarification regarding the notification requirements for reuse permits, addressing both new discharges and historically discharged effluent, should be developed to ensure the protection of existing water rights.

These above issues directly impact water management strategies recommended in the Region H Water Plan. In addition, Sections 11.042 and 11.046 of the Texas Water Code have not been amended to provide additional clarification. Therefore, regulatory clarification is required.

Policy Recommendation: The Region H Water Planning Group recommends that TCEQ resolve the issues related to the permitting of indirect reuse water rights. In addition, the RHWPG supports wastewater reuse as a management strategy, and recommends it to be advocated statewide through targeted State funding or other incentives to promote reuse projects.

Flood Liability of Water Supply Reservoirs

Discussion: Flood control reservoirs are generally drawn down at the beginning of the annual wet season so that when large rain events occur, the runoff may be captured and later released more slowly into the receiving stream. These reservoirs therefore reduce downstream flood levels and prevent inundation in low areas. In contrast, water supply reservoirs are operated to capture and retain as much stream flow as allowable under their permits in order to have supply available during periods of high demand. This practice results in less available storage volume to capture runoff during major storms. When a major storm event occurs upstream or above a water supply reservoir, the reservoir operator must sometimes release flood flows during and after the event to prevent flooding upstream of the reservoir or to prevent damage to the dam and other facilities associated with the reservoir. Although this flood flow can contribute to downstream flooding, most reservoirs actually reduce the amount of flooding which could have occurred had the reservoir not been constructed.

In recent years, plaintiffs with property in the downstream floodplains have brought multiple lawsuits against major water supply reservoir operators. Some recent court decisions have held the operators liable for damages to the downstream properties. If this trend is allowed to continue, it will increase insurance rates for these entities and will force operational changes to occur that may result in less available water supply for periods of need. The net effect to water users will be an increase in the cost of surface water throughout the state.

Policy Recommendation: Consider State legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.

Incorporation of Technology Advancements in Projections

Discussion: Current population projections based on traditional historic growth patterns may not accurately reflect the changes likely to occur in the future as digital connectivity continues to alter our economic, educational and social institutions.

Policy Recommendation: The Region H Water Planning Group recommends that the State direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.

Ongoing RWPG Activities

Discussion: It is apparent that the RWPGs will have to meet periodically to address changed conditions related to the adopted regional water management plans. Ongoing activities will include, but not be limited to:

1. Consideration of additions and modifications to the adopted plans
2. Serving as communications liaisons with the water user communities within each region
3. Assisting in the reconciliation of inter-regional water issues

It will be necessary to consider additional and adequate funding to support maintenance of the RWPGs. Also, the administrative provisions of Senate Bill One and the subsequent policies that have been enacted should be reviewed to determine if the appropriate organizational structure exists to accomplish the work of the RWPGs. Additional funding should be developed to support technical studies necessary to support the needs of the RWPGs.

Policy Recommendation: The Region H Water Planning Group recommends that the TWDB request additional and adequate funding and the adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs.

8.4.4 Recommendations Specific to Infrastructure Financing

Program / Policy Item: State Participation Program for regional water and wastewater projects

Discussion: This program enables the Water Development Board to assume a temporary ownership interest in a regional project when the local sponsors are unable to assume debt for an optimally sized facility. Payments on the funds provided by the State are deferred until a customer base grows into the capacity it funded. The deferred interest payments do not accrue additional interest. By funding up to 50% of a project, the program helps the local sponsors optimize facility sizes and avoid later expansions and replacements.

This program will be extremely important for the development of the recommended water management strategies, as well as for water treatment and distribution systems. Large projects, particularly reservoirs, must be developed in anticipation of future demands due to the long periods of time required for planning, permitting, property acquisition and construction. For example, Bedias Reservoir, which will require a transmission system as well as the reservoir itself, is estimated to cost $194.3 million. The current customer base cannot support this high cost. The Bureau of Reclamation no longer funds the development of new water supply reservoirs and this project would not qualify for other federal funding. Therefore, the State Participation program is one of the few programs available to assist local sponsors with this water management strategy. Other reservoir projects within Region H could also experience similar financing issues.

The State Participation Program will also be important during the expansion of surface water service into areas affected by subsidence. As areas develop and implement Groundwater Reduction Plans, it is expected that communities will develop plans for regional treatment and distribution systems to reduce costs. State participation in these facilities will allow them to be optimally sized at their inception. The State Participation Program offers the important advantage of reducing the unit costs for water service for both existing and future water users of the optimally sized facility.

Policy Recommendation: Increase funding of the State Participation Program as needed to allow development of these water supply projects.

Program / Policy Item: State Revolving Fund Programs (Drinking Water State Revolving Fund and Clean Water State Revolving Fund)

Discussion: These programs provide loans at subsidized interest rates for the construction of water treatment and distribution systems and for source water protection (DWSRF) and for wastewater collection and treatment systems (CWSRF). As the loans are paid off, the TWDB uses the funds to make new loans (thus the name Revolving Fund). State funds for the program receive a federal match through the Environmental Protection Agency. These loans are intended for projects to bring existing systems into compliance with rules and regulations, and are available to political subdivisions, water supply corporations and privately-owned water systems. Applications are collected at the beginning of each year, given a priority ranking, and funded to the extent possible. Projects not funded in a given year may carry forward into the next year’s ranking.

These programs are important in that they assist sub-standard water systems in attaining the minimum water quality mandated by Federal and State regulations, but they are not intended to fund system expansions due to projected growth. However, these programs may apply to individual systems in the Region experiencing water quality declines, or to those systems affected by the changed standard for Arsenic. The SRF Fund may also provide assistance to water providers with aging treatment systems and transmission lines.

Policy Recommendation: Increase the funding of this program in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.

Program / Policy Item: State Loan Program

Discussion: The State Loan Program provides loans to Political Subdivisions and Water Supply Corporations for water, wastewater, flood control and municipal solid waste projects. Payments are not deferred in this program as they are under the State Participation Program, and the interest rates are not subsidized as they are in the Revolving Fund Programs. These loans are available for both local projects and for the local sponsors of regional projects. Acquisition and construction of water treatment and distribution systems are eligible for funding. Loans are made on a first come, first served basis.

This program will be heavily utilized in groundwater-served areas introducing surface water to meet current and projected demands. The ready availability of groundwater across the region has allowed development to occur outside existing surface water service areas. As the limits of available groundwater are reached (sustainable yields and/or regulatory limits), surface water treatment and transmission systems must be constructed to meet future demands. The costs are significant in that they are required in a short time span, instead of initiated and expanded over time as they are in areas originally served by surface water. Where local rate payers cannot afford to directly pay for transition costs, State loans offer a significant cost advantage over most commercial and many public funding options, using the State’s high bond rating rather than the rating of the local sponsor.

Policy Recommendation: Increase funding of this program to meet near-term infrastructure cost projections.

Program / Policy Item: Agricultural Water Conservation Loan Program

Discussion: This program provides loans to soil and water conservation districts, underground water conservation districts and districts authorized to supply water for irrigation. These districts may further lend the funds to private individuals for equipment and materials, labor, preparation and installation costs to improve water-use efficiency related to irrigation of their private lands. There is also a grant program for equipment purchases by eligible districts for the measurement and evaluation of irrigation systems and agricultural water conservation practices, and for efficient irrigation and conservation demonstration projects, among others. However, these grants are not available to individual irrigators. Similar Federal loan and grant programs are available, but require a 25% to 50% local match.

In the Region H Water Plan, irrigation conservation is a recommended strategy in six counties (Brazoria, Chambers, Fort Bend, Galveston, Liberty and Waller), and is extremely important in Waller County where the reductions in irrigation are projected to allow reallocation of supply to meet municipal demands. As it is unlikely that municipalities will seek out and fund irrigation conservation projects, the task of encouraging conservation will fall to the wholesale water providers and those government entities with jurisdiction in those counties. Even with Agricultural Water Conservation

Loan Program assistance, irrigators will be slow to invest in water-conserving equipment until water rates increase, making it economically advantageous to do so. The difficulty increases in areas where groundwater is the primary supply source for irrigation.

Eligible districts will need to act as conservation brokers, identifying those irrigators with the potential to reduce water demand through equipment improvements, and matching them with available loans. By reducing usage in this manner, water suppliers will be able to provide the saved portion of their supply to new customers. To assist with the immediate adoption of these improved conservation practices, a one-time grant or subsidy program for water-efficient equipment purchases may help by reducing the loans amounts required by each irrigator. If the requirements of an existing Federal loan or grant program could be met, the State could provide all or part of the local matching share. Since the methods used by irrigators vary across the state, such a program would need to be flexible, with local oversight provided by those districts currently eligible for the Agricultural Water Conservation Loan Program. Consistency with the applicable Regional Water Plan may be included as a prerequisite for this program, as it is for other State grants and loans.

Policy Recommendation: Provide a mechanism to leverage Federal grant programs by providing the local matching share. Increase funding of this loan program and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators.

Program / Policy Item: Texas Community Development Program

Discussion: The federal Community Development Block Grant program provides grants and loans to low-income communities for certain projects, including water and wastewater infrastructure. It is administered in Texas under the Office of Rural Community Affairs as the Texas Community Development Program. The Small Town Environment Program (STEP) under the TCDP provides water and sewer system grants to cities and counties not eligible for funding under the Colonias or Economically Disadvantaged Areas Programs (EDAP). Within Region H, there are no Colonias or EDAP-eligible communities, but STEP grants may be obtained.

Policy Recommendation: Continue State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.

Program / Policy Item: Regional Water Supply and Wastewater Facilities Planning Program

Discussion: This program provides planning grants to Political Subdivisions for studies and analyses to determine feasible alternatives for regional water supply and wastewater facility needs. The planning must include more than one service area or political subdivision to be considered regional. Grants are generally limited to 50% of the total cost, and cannot be applied to the preparation of state and federal permits, administrative or legal proceedings of regulatory agencies, or the preparation of engineering plans and specifications.

This grant program can assist in planning for local areas, particularly the unincorporated areas of each county. Local sponsors investigating the best means to serve their populations may join with neighboring communities and water providers and request a planning grant, thus reducing their individual planning costs. Determination of the optimal institutional arrangement between political subdivisions is one of the eligible study areas under this program. Should a regional facility prove to be the best solution for the group, they may elect to pursue additional support from the State Loan and Participation programs.

One limitation of the program is that it cannot be applied to the detailed facility planning or preliminary engineering design of the proposed facility. These early engineering phase costs can represent as much as 30% of the cost of the facility, and generally must be completed before accurate financial requirements can be defined. Inclusion of these costs in either the planning grant or pre-project loan programs would better help these small communities develop the projects they need.

Policy Recommendation: Increase funding of this program in anticipation of upcoming development throughout the state, and expand the program to include the preliminary engineering design costs for recommended facilities.

Program / Policy Item: Water and Waste Disposal Loans and Grants from the USDA Rural Utilities Service

Discussion: This Federal program provides loans and grants in rural areas and communities of up to 10,000 people for water, wastewater, storm water and municipal solid waste projects. The program is intended for communities that cannot obtain commercial loans at reasonable rates. Loans are made at or below market rates, depending upon the eligibility of the recipient. Grants can cover up to 75% of project costs when required to reduce user costs to a reasonable level. A separate program of Emergency Community Water Assistance Grants (up to $500,000 per project) is also available to communities experiencing rapid declines in water quality or quantity.

This program is similar to the state loan and revolving fund programs. It offers another option to small communities and rural areas unable to finance required infrastructure without assistance. However, this is a nationwide program, and the competition for available funds is correspondingly greater. Colonias and border areas are specifically identified as target areas for the grant portion of this program, and it is therefore in the State's interest to support its continued funding.

The TWDB was recently authorized by the 77th Texas legislature to establish a similar program at the state level. The Rural Water Assistance Fund will provide low-interest loans to municipalities, water districts and non-profit water supply corporations. The program is still under development and has not yet been funded.

Policy Recommendation: Support continued and increased funding of this program at the Federal level, and fund the State Rural Water Assistance Fund.

Program / Policy Item: Desalination Research and Demonstration Projects

Discussion: House Bill 1370 of the 78th Texas legislature directed the Texas Water Development Board to "undertake or participate in research, feasibility and facility planning studies, investigations and surveys as it considers necessary to further the development of cost-effective water supplies from seawater desalination in the state." The TWDB has concluded desalination site assessments, and is preparing to assist in the construction of three demonstration facilities along the Texas Gulf Coast. The Region H Water Planning Group supports this demonstration project.

Policy Recommendation: Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs.

Program / Policy Item: Water Research Program - Agriculture

Discussion: The Texas Water Development Board offers research grants to individuals or political subdivisions for water research on topics published in the Board's Request for Proposals. Eligible topics include product and process development.

In the Region H Water Plan, one recommendation to the legislature is to establish funding for agricultural research in the areas of efficient irrigation practices and the development of water-efficient and drought-resistant crop and species. Irrigators cannot generally afford the increased cost of water when new supplies are developed in today's market. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming. This is another potential topic for the Water Research Program.

Policy Recommendation: Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.

Program / Policy Item: Federal Civil Works projects

Discussion: The U.S. Army Corps of Engineers (USACE) builds and operates dams and reservoirs for flood control purposes under its Civil Works program. Congress authorizes funding on a project by project basis. Under current regulations, storage in these reservoirs may be used for present and future municipal and industrial water supply, but that portion of the project must be funded by a non-Federal agency. Also, only 30% of the M&I water storage may be allocated to future needs. The balance must supply existing water users, as the repayment schedule for non-Federal costs is capped at 30 years. USACE is also authorized to fund projects for navigation, water quality improvement and ecosystem restoration.

As a result of the first round of Regional Water Planning, the Texas Congressional Delegation requested a study on the potential for federal assistance with water supply in Texas. The Fort Worth District recently published the Texas Water Allocation Assessment Report, which identifies those projects that USACE might participate in. Within Region H, only Bedias Reservoir might receive USACE funding if the scope of the project were modified to include flood control. Also discussed were potential modifications to existing reservoirs to increase water supply yields (these modifications are generally limited to a 15% increase in storage). A saltwater barrier to improve water quality in the Brazos River was also identified as a potential project. USACE also has the ability to provide planning assistance to states for regional water supply studies, particularly studies crossing state and international boundaries.

Limitations for USACE assistance with water supply projects are (1) current policy preventing the USACE from participating in single–purpose water supply projects, (2) USACE inability to share the cost of water supply projects, and (3) the time required to move appropriations actions through the federal government.. The Texas Congressional Delegation could pursue changes to the governing regulations to allow participation in water supply projects, or to increase the percentage of water supply storage for future use allowed in USACE projects. However, USACE civil works projects are authorized individually by Congress. If the project sponsor desires USACE assistance, an exception permitting that assistance might be authorized in the same appropriation bill. The latter option requires the sponsor to have a project champion in Congress.

Policy Recommendation: Support regulatory changes that will allow USACE to increase water supply storage in new reservoirs which they construct and manage, and investigate other alternatives for increased involvement by USACE in funding water supply projects.

Program / Policy Item: Regionalization

Discussion: As communities assess the growing costs of water infrastructure, economies of scale can be realized by combining the needs of water user groups into larger, more efficient water supply, treatment and distribution facilities. Regional facilities offer interconnections between existing systems, which can increase overall reliability. The individual system connections to these systems can be phased over time to meet regional demands with less impact on individual systems than each individually trying to expand. In areas where groundwater limits are being reached, regional groups can identify areas where surface water supply is most needed, and allow other areas to remain on groundwater systems. Sharing costs across a wide customer base keeps rates comparable between service areas.

A range of cooperative options exists, including formation of regional authorities, inter-local agreements, public-private partnerships, local government corporations and public contracting with a private regional supplier. The optimal arrangement between political subdivisions depends upon the specific project and the goals of the parties. Partnerships with private investors through public-private partnerships and direct contracting with privately-owned facilities offer an advantage of using private financing to meet part of the initial planning and construction costs. The regulations governing these partnerships must protect the public represented by the partnership, but if too restrictive, may prevent the partnership from realizing potential cost savings though the use of private-sector procurement and construction practices.

Consideration should be given to reducing procurement restrictions for Local Government Corporations to encourage the pooling of resources for funding regional projects. Also, existing assistance programs should remain available when political subdivisions enter into public/public or public/private partnerships.

Policy Recommendation: Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

This Page

Intentionally Left Blank

Contents

List of Tables

List of Figures

Appendices

This Page

Intentionally Left Blank

Chapter 9 – Water Infrastructure Financing Recommendations

9.1 Introduction

In Senate Bill 2 of the 77th Texas Legislature, the preparation of an Infrastructure Financing Report (IFR) was added to the regional planning process. The purpose of the IFR is to identify the funding needed to implement the water management strategies (WMS) recommended in the 2011 Regional Water Plan. The primary objectives of this chapter/report are:

- Determine the number of Political Subdivisions with identified needs that will be unable to finance their water infrastructure needs;
- Determine the amount of infrastructure costs in the 2011 Regional Water Plan that cannot be financed by the local Political Subdivisions;
- Determine funding options, such as State funding, that are proposed by the Political Subdivisions to finance water infrastructure costs that cannot be financed locally; and
- Determine additional roles the Regional Water Planning Group proposes for the State in financing the recommended water supply projects.

A survey of Water User Groups (WUGs) with identified infrastructure needs was conducted and the results of those surveys are summarized in *Section 9.3* of this chapter. The remainder of *Chapter 9* discusses each proposed WIF project detailing its location in the regional water plan, the sources and Water User Groups associated with the project.

The Region H Water Planning Group reviewed the current role of the State in financing water supply projects and made recommendations for program increases and new initiatives in *Chapter 8* of this plan.

9.2 Capital Costs for the 2011 Region H Water Plan

The estimated cost of the 2011 Region H Water Plan is approximately $12.0 billion over the 50-year planning period. This cost includes the development of new water sources, estimates for distribution and treatment facilities, and the capital improvements required to achieve agricultural conservation targets. WMS such as new water source projects and GRPs are estimated at $2.0 billion (see *Tables 9-1 and 9-2*). Large-scale treatment and transmission system expansions for the Chambers-Liberty County Navigational District, Huntsville, North Harris County Regional Water Authority (NHCRWA), the West Harris County Regional Water Authority (WHCRWA), the North Fort Bend Water Authority (NFBWA), the San Jacinto River Authority (SJRA) and the City of Houston are estimated at $5.9 billion (see *Table 9-2*).

As can be seen in *Table 9-1*, several recommended WMS such as reallocate existing water supplies require no capital expenditure beyond WUG infrastructure expansions. These costs are reflected in the WUG cost estimates in *Appendix 4C*, and are summarized in *Table 9-1*. Also, several strategies require the Luce Bayou Transfer water management strategy to move existing supplies from the Trinity River Basin to Harris and Montgomery Counties. Note that the project volume listed in *Table 9-1* is not necessarily indicative of new yield; for example, the transmission line projects do not create new yield but rather convey volumes generated by other projects.

Table 9-1

Recommended Water Supply and Transmission Strategies

WMS	Max Project Volume (ac-ft/yr)	WWP Capital Cost $	WUG Capital Cost $	Starting Decade
Conservation Strategies:				
Industrial Conservation	TBD	$0	TBD	2010
Irrigation Conservation	77,881	$0	$757,436	2010
Municipal Conservation	105,494	$0	$0	2010
Contractual Strategies:				
Expand/Increase Current Contracts	142,599	$0	See Contracts	2010
New Contracts from Existing Supplies	83,558	$0	See Contracts	2010
Reallocation of Existing Supplies	N/A	$0	See Contracts	2010
TRA to SJRA Contract	76,476	$302,781,597	See Contracts	2040
TRA to Houston Contract	123,524	See Luce Bayou	See Contracts	2030
WUG-Level Contracts	N/A	$0	$2,390,273,157	2010
WWP Contracts	N/A	$0	$0	2010
Groundwater Strategies:				
Expanded Use of Groundwater	90,617	$0	$165,928,999	2010
Interim Strategies	45,512	$0	$86,701,535	2010
New Groundwater Wells for Livestock	41	$0	$18,635	2020
Groundwater Reduction Plans:				
CHCRWA GRP	4,806	See CHCRWA Trans.	$0	2010
COH GRP	TBD	See COH Treatment	$58,235,873	2010
City of Missouri City GRP	17,562	$92,070,990	$6,618,706	2010
Fort Bend MUD 25 GRP	589	$0	$776,145	2020 (2013)
Fort Bend WCID 2 GRP	5,753	$24,828,857	$0	2020 (2013)
NFBWA GRP	106,402	See NFBWA Trans.	$1,638,063	2020 (2013)
NHCRWA GRP	117,755	See NHCRWA Trans.	$17,814,585	2010
Pecan Grove GRP	1,700	$0	$15,960,000	2020 (2013)
Richmond/Rosenberg GRP	7,500	$117,220,150	$0	2020 (2013)
River Plantation GRP	368	$0	$484,926	2010
SJRA WRAP	129,010	$900,000,000	$217,856,853	2020 (2013)
Sugar Land GRP	9,796	$161,360,049	$6,360,101	2020 (2013)
WHCRWA GRP	78,839	See WHCRWA Trans	$35,268,970	2010
Infrastructure Strategies:				
CHCRWA Transmission Line	4,806	TBD	N/A	2010
CHCRWA Internal Distribution	4,806	TBD	N/A	2010
CLCND West Chambers System	2,800	$20,380,000	See WUG Contracts	2020 (2014)
COH Distribution Expansion	TBD	$261,040,000	N/A	2010
COH Treatment Expansion	Varies by decade	$2,045,672,161	N/A	2010
Harris County MUD 50 WTP	632	$0	$6,131,600	2020 (2013)
Huntsville WTP	11,200	$61,023,906	$0	2010
LLWSSSC Surface Water Project	954	$0	$3,087,974	2010
Luce Bayou Transfer	450,000	$253,916,914	$0	2020
NFBWA Internal Distribution	106,402	$225,000,000	N/A	2020 (2013)
NFBWA Shared Transmission Line	71,876	$213,000,000	N/A	2020 (2013)
NHCRWA Internal 2010 Distribution	34,714	$153,149,640	N/A	2010
NHCRWA Internal 2020 Distribution	91,167	$345,292,192	N/A	2020
NHCRWA Internal 2030 Distribution	117,755	$37,439,584	N/A	2030
NHCRWA Transmission 2010	34,714	$80,690,624	N/A	2010
NHCRWA Transmission 2020	91,167	$172,558,512	N/A	2020
NHCRWA Transmission 2030	117,755	$0	N/A	2030
Pearland SWTP	13,420	$0	$265,000,000	TBD
Sealy GW Treatment Expansion	888	$0	$6,450,000	2020
WHCRWA Internal Distribution	78,839	$552,472,000	N/A	2010
WHCRWA Transmission Line	78,839	$290,084,193	N/A	2010
Reservoir Strategies:				
Allens Creek Reservoir	99,650	$222,752,400	See WUG Contracts	2020

Brazoria County Off-channel Reservoir	24,100	$173,898,602	See WUG Contracts	2060
Dow Off-channel Reservoir	21,800	$124,468,000	See WUG Contracts	2020
Fort Bend County Off-channel Reservoir	46,000	$202,514,788	See WUG Contracts	2050
GCWA Off-channel Reservoir	39,500	$197,448,012	See WUG Contracts	2030
Reuse Strategies:				
Fulshear Reuse	430	$0	$566,625	TBD
Houston Indirect Reuse	128,801	$0	$721,822,850	2040
Montgomery MUD 8/9 Indirect Reuse	1,120	$0	$12,245,687	2016
NHCRWA Indirect Reuse	16,300	$0	$66,778,694	2040
Wastewater Reuse for Industry	67,200	$332,051,761	$0	2060
Wastewater Reclamation for Municipal Irrigation	36,388	$0	$48,043,249	2030
Permit Strategies:				
BRA System Operations Permit	25,400	TBD	See WUG Contracts	2020
Houston Bayous Permit	0	$20,956,000	$0	2020
Other Strategies:				
Brazoria Co. Interruptible Supplies for Irrigation	104,977	$0	$0	2010
Freeport Desalination Plant	33,600	$255,699,000	See WUG Contracts	2050
Brazos Saltwater Barrier	N/A	$44,470,739	$0	2030

The distribution of capital costs over the planning period is shown in *Figure 9-1*. WUG-level capital costs are represented as starting in the years indicated. If necessitated by increasing strategy volumes, WUG capital costs are also shown in subsequent decades, reflecting phased infrastructure expansion to handle additional project capacity. A significant portion of the overall infrastructure will be built before 2030 due to groundwater reduction goals. The City of Houston, SJRA and Regional Water Authorities cost projection reflects meeting the surface water conversion milestones in Harris, Fort Bend and Montgomery Counties as a result of local subsidence district regulations.

Table 9-2

Total Supply and Transmission Cost

Water Supply and GRP	WUG (Conservation)[1]	$757,436
	WUG (Surface Water)	$2,809,216,282
	WUG (Groundwater	$474,128,769
	WUG (Reuse)	$850,718,176
	WWP (WMS)	$1,969,739,347
	Total For Water Management Strategies	**$6,104,560,010**
Major Transmission / Treatment Infrastructure	City of Houston[2]	$2,560,629,075
	City of Huntsville	$61,023,906
	NHCRWA[3]	$789,130,552
	CLCND	$20,380,000
	WHCRWA[4]	$842,556,193
	NFBWA[5]	$438,000,000
	SJRA[6]	$1,202,781,597
	Total Transmission Infrastructure Cost	**$5,914,501,323**
Total Supply and Transmission Infrastructure Cost		**$12,019,061,333**

1 Conservation capital costs for irrigation. Very little conservation cost is capital for infrastructure, with many costs occurring at the annual or per acre-foot level.

2 City of Houston water treatment / transmission infrastructure costs, period 2007 - 2030, are based on information obtained from the City of Houston. Also includes the cost of the Luce Bayou conveyance

3 NHCRWA water transmission infrastructure costs are based on information obtained from the NHCRWA Consultant Team

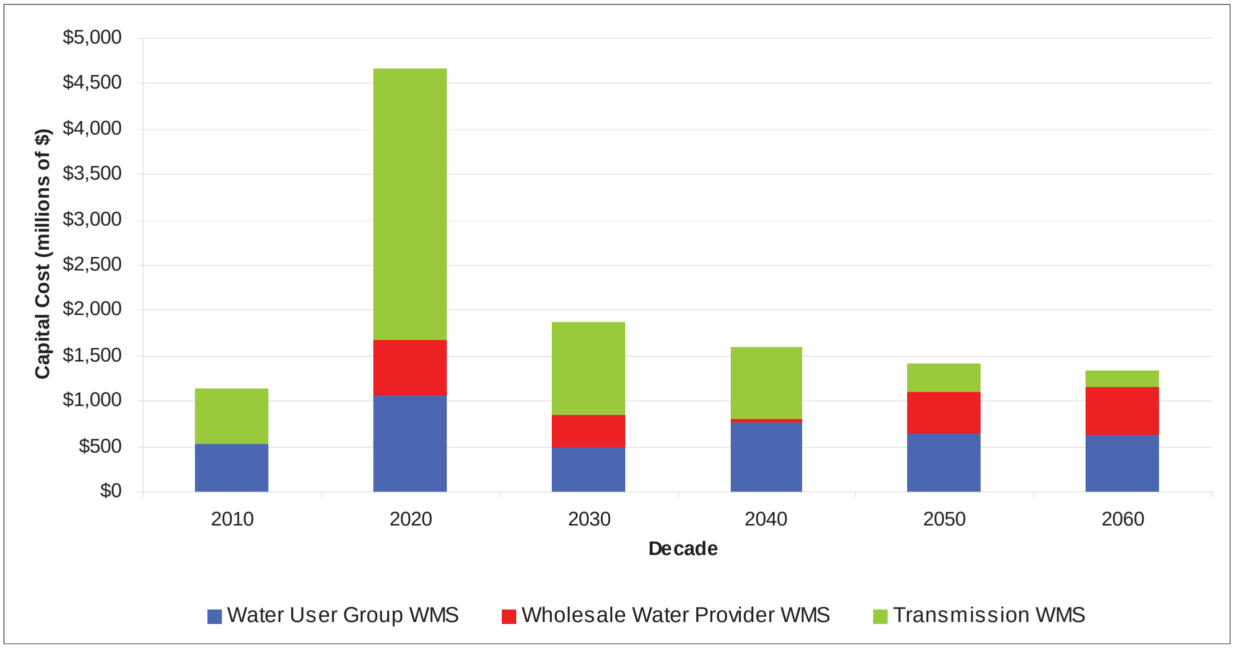
4 WHCRWA water transmission infrastructure costs are based on information obtained from the WHCRWA Consultant Team

5 NFBWA water transmission infrastructure costs are based on “North Fort Bend Water Authority, Groundwater Reduction Plan”, Brown and Gay & TCB/AECOM, March 2008.

6 SJRA water transmission infrastructure costs for the SJRA WRAP are based on “Montgomery County Alternative Water Supply Program”, Brown and Gay, February 2009. Value also includes costs estimated by Region H Consultant for TRA to SJRA transfer conveyance.

Figure 9-1

Costs by Decade and Category



WUG and WWP infrastructure costs occur early in the planning period due to the groundwater reduction goals. In the past, the ability to easily drill groundwater wells throughout the region has allowed development to occur at significant distances from surface water sources. As projected water demands surpass the sustainable yield of the Gulf Coast Aquifer, communities face the need to construct long pipelines and treatment facilities. Regulations enacted by the Harris-Galveston Subsidence District and the Fort Bend Subsidence District limit groundwater use to a percentage of total demand within those counties. Surface water conversion milestones are mandated in 2020 and 2030 for Harris County, and in 2013 and 2025 in Fort Bend County. Groundwater pumpage in Montgomery County is regulated by the Lone Star Groundwater Conservation District to 64,000 acre-feet per year, the sustainable yield of the Gulf Coast Aquifer within Montgomery County. The first surface water conversion milestones in Montgomery County are mandated in 2015.

Water conservation is a major component of the Region H Water Plan, accounting for up to 183,000 acre-feet per year of reduced demand. Irrigation conservation is recommended in six counties, with potential reductions ranging from 10 to 28 percent of demand. These savings are to be achieved through the lining of irrigation canals, multiple irrigation inlets, and the laser-leveling of rice fields. Both of these methods require capital expenditures, with lining of irrigation canals totaling approximately $757,000 and on–farm methods totaling approximately $7,744,000 over the six counties.

Municipal conservation does not require additional infrastructure to be constructed, but incurs a cost per acre-foot to achieve the target savings. Depending upon the size of the WUG, conservation is estimated as reducing demand by 5.5 to 6.3 percent, at a cost of $202 to $311 per acre-foot. This cost per acre-foot of savings is used in the strategy tables in *Chapter 4*. However, the cost of conservation measures would be paid as an incremental addition to the rate paid by end users.

9.3 Infrastructure Financing Survey

The following sections describe the results of an Infrastructure Financing Survey performed as part of the 2011 Plan. For the 2011 Plan update, the Texas Water Development Board (TWDB) developed a web-based survey tool and methodology for Water User Groups to report their projected need for water infrastructure funding, linking the cost to their recommended Water Management Strategies. The Region H Water Planning Group was responsible for notifying districts and municipalities and regional water providers, conducting the survey, and reporting the findings as an update to this section of the Regional Water Plan.

Surveys were sent to 223 political subdivisions and districts that were presumed to have project water shortages and anticipated capital cost in the 2011 Region H Water Plan. In the survey, WUGs were asked to specify the amount of funding from the TWDB needed for future projects. Funding for applicable water infrastructure projects is available from the TWDB through the categories listed below:

- Planning, design, permitting is for entities that want to participate in the WIF-Deferred Program. The WIF-Deferred program offers subsidized interest and deferral of a principal and interest for up to 10 years.

- Acquisition and construction is for entities that want to participate in the WIF-Construction Program, in which offers subsidized interest for all construction costs including planning, acquisition, design and construction.

- Excess Capacity is for entities that want to participate in the State Participation Program. The State Participating funding offers partial interest and principal deferral for the incremental cost of project elements that are designed and built to serve needs beyond 10 years.

- Rural is for entities that want to participate in the Rural Water Assistance Program. This program funds grants and 0 percent interest loans for service areas that are not in a Metropolitan Statistical Area (MSA) and where the population does not exceed 5,000. This MSA must meet the Economically Distressed Areas Program (EDAP) eligibility criteria.

- Disadvantaged is for entities wanting to participate in the Economically Distressed Area Program (EDAP). This program is a financial assistance program to address the water and wastewater needs of economically distress area. Eligibility for TWDB EDAP requires that the median household income of the area to be served by the proposed project to be less than 75 percent of the Texas median household income ($39,927), according to the 2000 census. EDAP eligibility also requires adoption of Model Subdivision rules by the appropriate planning entities.

9.3.1 Summary of Survey Responses

The following survey responses were received before August 18, 2010.

Ames

Ames indicated that financial assistance for future projects is not needed from TWDB.

Brazos River Authority

The Brazos River Authority (BRA) was surveyed by Region G. Results of the survey obtained from the TWDB indicated that three BRA sponsored projects in Region H would require financial assistance from the TWDB. The BRA has indicated that $15 million would be requested from the WIF-Construction Program in 2015 and $15 million from the State Participation Program in 2017 for the construction of the Allens Creek Reservoir in Austin County. This off-channel reservoir project will develop water from the Little River watershed for future use in Brazoria, Fort Bend and Galveston Counties. The BRA has also indicated that $255 million will be needed through the WIF-Construction Program in 2040 for the Freeport Seawater Desalination project. This water management strategy is projected to supply manufacturing demands in Brazoria County beginning in 2050. The third project, the Brazos Saltwater Barrier described in Tech Memo 4B-39, does not increase yield but does improve water quality. The BRA indicated that $35 million would be needed through the WIF-Construction Program in 2020 to fund the project. The water source and projected WUGs associated with the Allens Creek Reservoir and Freeport Seawater Desalination projects are listed below.

WATER MANAGEMENT STRATEGIES			
Allens Creek Reservoir (Tech Memo 4B-26)			
SOURCES	SOURCE ID	COUNTY	BASIN
ALLENS CREEK LAKE/RESERVOIR	12900	RESERVOIR	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN
ALVIN	080013000	BRAZORIA	SAN JACINTO-BRAZOS
CLEAR LAKE SHORES	080764000	GALVESTON	SAN JACINTO-BRAZOS
DICKINSON	080165000	GALVESTON	SAN JACINTO-BRAZOS
IRRIGATION	081004020	BRAZORIA	SAN JACINTO-BRAZOS
IRRIGATION	081004020	BRAZORIA	BRAZOS
IRRIGATION	081004084	GALVESTON	SAN JACINTO-BRAZOS
KEMAH	080316000	GALVESTON	SAN JACINTO-BRAZOS
LEAGUE CITY	080350000	GALVESTON	SAN JACINTO-BRAZOS
LEAGUE CITY	080350000	HARRIS	SAN JACINTO-BRAZOS
MANVEL	080721000	BRAZORIA	SAN JACINTO-BRAZOS
MINING	081003084	GALVESTON	SAN JACINTO-BRAZOS
MISSOURI CITY	080409000	HARRIS	SAN JACINTO
PEARLAND	080457000	BRAZORIA	SAN JACINTO-BRAZOS
PEARLAND	080457000	HARRIS	SAN JACINTO-BRAZOS
STEAM ELECTRIC POWER	081002084	GALVESTON	SAN JACINTO-BRAZOS
COUNTY-OTHER	080757020	BRAZORIA	SAN JACINTO-BRAZOS
COUNTY-OTHER	080757020	BRAZORIA	BRAZOS
COUNTY-OTHER	080757020	BRAZORIA	BRAZOS-COLORADO

WATER MANAGEMENT STRATEGIES

Allens Creek Reservoir (Tech Memo 4B-26)

SOURCES	SOURCE ID	COUNTY	BASIN
ALLENS CREEK LAKE/RESERVOIR	12900	RESERVOIR	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MANUFACTURING	081001020	BRAZORIA	SAN JACINTO-BRAZOS
MANUFACTURING	081001020	BRAZORIA	BRAZOS
MINING	081003020	BRAZORIA	SAN JACINTO-BRAZOS
MINING	081003020	BRAZORIA	BRAZOS
MINING	081003020	BRAZORIA	BRAZOS-COLORADO
COUNTY-OTHER	080757079	FORT BEND	SAN JACINTO
COUNTY-OTHER	080757079	FORT BEND	SAN JACINTO-BRAZOS
COUNTY-OTHER	080757079	FORT BEND	BRAZOS
FAIRCHILDS	081019000	FORT BEND	BRAZOS
FIRST COLONY MUD #9	084113000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #106	084117000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #23	084121000	FORT BEND	SAN JACINTO-BRAZOS
FORT BEND COUNTY MUD #25	084122000	FORT BEND	SAN JACINTO-BRAZOS
FORT BEND COUNTY MUD #81	084129000	FORT BEND	BRAZOS
MANUFACTURING	081001079	FORT BEND	SAN JACINTO
MANUFACTURING	081001079	FORT BEND	BRAZOS
MINING	081003079	FORT BEND	SAN JACINTO
MINING	081003079	FORT BEND	BRAZOS
MINING	081003079	FORT BEND	SAN JACINTO-BRAZOS
ORBIT SYSTEMS INC	084294000	FORT BEND	SAN JACINTO-BRAZOS
PLANTATION MUD	084303000	FORT BEND	SAN JACINTO-BRAZOS
RICHMOND	080500000	FORT BEND	BRAZOS
ROSENBERG	080518000	FORT BEND	BRAZOS
SUGAR LAND	080585000	FORT BEND	SAN JACINTO-BRAZOS

WATER MANAGEMENT STRATEGIES

Freeport Seawater Desalination Project (Tech Memo 4B-40)

SOURCES	SOURCE ID	COUNTY	BASIN
FREEPORT DESALINATION PLANT	FPDESAL	RESERVOIR	GULF
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MANUFACTURING	081001020	BRAZORIA	SAN JACINTO-BRAZOS
MANUFACTURING	081001020	BRAZORIA	BRAZOS

Buffalo

Buffalo, located in the Trinity Basin, indicated that TWDB financial assistance for future projects is not needed through any of the five funding categories.

Chambers-Liberty Counties Navigation District

Chambers-Liberty Counties Navigation District (CLCND) indicated on their survey that the district will need approximately $20 million in funding for future water management strategies. CLCND anticipates using $2 million from the WIF-Deferred Program in 2012 and approximately $18 million from the WIF-Construction Program in 2015. The project will treat water from the Trinity River and supply municipal water users in the Trinity and Trinity-San Jacinto Basins including: Mont Belvieu, Old River Winfree, County-Other, and Beach City. The water source and projected WUGs are listed below.

WATER MANAGEMENT STRATEGIES			
CLCND W Chambers System (Tech Memo 4B-18)			
SOURCES	SOURCE ID	COUNTY	BASIN
TRINITY RIVER RUN-OF-RIVER	3460804279B	CHAMBERS	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MONT BELVIEU	080413000	CHAMBERS	TRINITY
MONT BELVIEU	080413000	CHAMBERS	TRINITY-SAN JACINTO
OLD RIVER-WINFREE	080727000	CHAMBERS	TRINITY
COUNTY-OTHER	080757036	CHAMBERS	TRINITY
COUNTY-OTHER	080757036	CHAMBERS	TRINITY-SAN JACINTO
BEACH CITY	080822000	CHAMBERS	TRINITY
BEACH CITY	080822000	CHAMBERS	TRINITY-SAN JACINTO

City of Houston

The City of Houston has identified the funding needs for eight water management strategies. The City indicated that the projects will require almost $3.4 billion in funding primarily from the WIF-Deferred, WIF-Construction and the State Participation Program. The City of Houston also commented that some funding may be requested in the future from the Economically Distressed Areas Program. The table below summarizes the use of funding requested from each loan program. The table does not indicate the amounts that the City may request through the Economically Distressed Area Program.

PROJECT NAME	FUNDING TYPE				
	WIF-Deferred Program	WIF-Construction Program	State Participation Program	Rural Water Assistance Program	Economically Distressed Areas Program
Expanded Use of GW	$363,154 (2015)	$2,057,875 (2016)	0	0	0
COH Treatment Expansion	$306,850,824 (2013)	$1,738,821,337 (2014)	0	0	0

PROJECT NAME	FUNDING TYPE				
	WIF-Deferred Program	WIF-Construction Program	State Participation Program	Rural Water Assistance Program	Economically Distressed Areas Program
COH Distribution Expansion	$39,156,000 (2010)	$221,884,000 (2010)	0	0	0
Luce Bayou	$38,087,537 (2011)	$88,870,920 (2014)	$126,958,457 (2014)	0	0
Allens Creek Reservoir	$30,000,000 (2017)	$100,000,000 (2018)	$25,926,680 (2018)	0	0
Houston Indirect Reuse	$45,907,933 (2035)	$260,144,951 (2036)	0	0	0
Wastewater Reuse for Industry	$49,807,764 (2055)	$282,243,997 (2056)	0	0	0
Houston Bayous Permit	$3,143,400 (2020)	$17,812,600 (2020)	0	0	0

The projects identified in the survey include Expanded Use of Groundwater, COH Treatment Expansion, COH Distribution Expansion, Luce Bayou, Allens Creek Reservoir, Houston Indirect Reuse, Wastewater Reuse for Industry and the Houston Bayous Permit. The Luce Bayou strategy involves transferring water from Lake Livingston in the Trinity Basin to Lake Houston in the San Jacinto Basin. The COH Treatment Expansion and Distribution Expansion strategies involve expanding the City's capacity to treat and transport water from Lake Livingston and Lake Houston. The Allens Creek Reservoir strategy will develop water for use in Brazoria, Fort Bend and Galveston Counties. The Houston Indirect Reuse strategy will provide water for multiple uses in Harris County. The Wastewater Reuse for Industry strategy will provide water for industrial users in Harris County. Expanded Use of Groundwater was recommended to expand the City's groundwater capacity in future decades. Funding requested for the Houston Bayous Permit is for future infrastructure that will allow the City to capture and utilize interruptible water supplies in lieu of supplies from Lake Houston and Lake Livingston. The following tables provide the sources and Water User Group information for the funding requested from the TWDB.

WATER MANAGEMENT STRATEGIES			
Luce Bayou (Tech Memo 4B-21) **COH Treatment Expansion (Tech Memo 4B-19)** **COH Distribution Expansion (Tech Memo 4B-19)**			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
LAKE HOUSTON	10060	RESERVOIR	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
SUNBELT FWSD	084350000	HARRIS	SAN JACINTO
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO
HUMBLE	080289000	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Luce Bayou (Tech Memo 4B-21) **COH Treatment Expansion (Tech Memo 4B-19)** **COH Distribution Expansion (Tech Memo 4B-19)**			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
LAKE HOUSTON	10060	RESERVOIR	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
HUMBLE	080289000	HARRIS	SAN JACINTO
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO
MANUFACTURING	081001101	HARRIS	SAN JACINTO-BRAZOS
MANUFACTURING	081001101	HARRIS	SAN JACINTO-BRAZOS
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO-BRAZOS
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO-BRAZOS
BELLAIRE	080046000	HARRIS	SAN JACINTO
BELLAIRE	080046000	HARRIS	SAN JACINTO
BRITMOORE UTILITIES	084036000	HARRIS	SAN JACINTO
BUNKER HILL VILLAGE	080085000	HARRIS	SAN JACINTO
CANDLELIGHT HILLS SUBDIVISION	084043000	HARRIS	SAN JACINTO
CHIMNEY HILL MUD	084053000	HARRIS	SAN JACINTO
CONSUMERS WATER INC	084072000	HARRIS	SAN JACINTO
COUNTY-OTHER	080757101	HARRIS	SAN JACINTO
COUNTY-OTHER	080757101	HARRIS	SAN JACINTO-BRAZOS
CRYSTAL SPRNGS WATER COMPANY	084081000	HARRIS	SAN JACINTO
FOUNTAINVIEW SUBDIVISION	084132000	HARRIS	SAN JACINTO
GALENA PARK	080226000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #158	084165000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #261	084179000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #345	084182000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #5	084184000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #8	084189000	HARRIS	SAN JACINTO
HARRIS COUNTY WCID #76	084199000	HARRIS	SAN JACINTO
HEDWIG VILLAGE	080269000	HARRIS	SAN JACINTO
HILSHIRE VILLAGE	081025000	HARRIS	SAN JACINTO
HUNTERS CREEK VILLAGE	080290000	HARRIS	SAN JACINTO
JACINTO CITY	080301000	HARRIS	SAN JACINTO
MINING	081003101	HARRIS	SAN JACINTO
MINING	081003101	HARRIS	SAN JACINTO-BRAZOS

WATER MANAGEMENT STRATEGIES			
Luce Bayou (Tech Memo 4B-21) COH Treatment Expansion (Tech Memo 4B-19) COH Distribution Expansion (Tech Memo 4B-19)			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
LAKE HOUSTON	10060	RESERVOIR	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
FOUNTAINVIEW SUBDIVISION	084132000	HARRIS	SAN JACINTO
GALENA PARK	080226000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #158	084165000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #261	084179000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #345	084182000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #5	084184000	HARRIS	SAN JACINTO
HARRIS COUNTY MUD #8	084189000	HARRIS	SAN JACINTO
HARRIS COUNTY WCID #76	084199000	HARRIS	SAN JACINTO
HEDWIG VILLAGE	080269000	HARRIS	SAN JACINTO
HILSHIRE VILLAGE	081025000	HARRIS	SAN JACINTO
HUNTERS CREEK VILLAGE	080290000	HARRIS	SAN JACINTO
JACINTO CITY	080301000	HARRIS	SAN JACINTO
MINING	081003101	HARRIS	SAN JACINTO
MINING	081003101	HARRIS	SAN JACINTO-BRAZOS
PARKWAY UD	084298000	HARRIS	SAN JACINTO
PINEY POINT VILLAGE	080468000	HARRIS	SAN JACINTO
ROLLING FORK PUD	084411000	HARRIS	SAN JACINTO
SOUTHSIDE PLACE	080572000	HARRIS	SAN JACINTO
SOUTHWEST UTILITIES	084343000	HARRIS	SAN JACINTO
SPRING VALLEY	080575000	HARRIS	SAN JACINTO
WEST UNIVERSITY PL.	080643000	HARRIS	SAN JACINTO
WILLOW RUN SUBDIVISION	084398000	HARRIS	SAN JACINTO
WINDFERN FOREST UD	084401000	HARRIS	SAN JACINTO

Note: Water User Groups are not directly associated with this strategy. Water from the sources above is allocated in the City of Houston to WUG strategy.

WATER MANAGEMENT STRATEGIES			
Allens Creek Reservoir (Tech Memo 4B-26)			
SOURCES	SOURCE ID	COUNTY	BASIN
ALLENS CREEK LAKE/RESERVOIR	12900	RESERVOIR	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN

Note: Water User Groups allocated water from the Allens Creek Reservoir are listed under BRA. In the 2011 Region H Water Plan, the City of Houston does not directly provide water from Allens Creek to Water User Groups.

WATER MANAGEMENT STRATEGIES			
Expanded Use of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	10115	HARRIS	SAN JACINTO
GULF COAST AQUIFER	17015	MONTGOMERY	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
HOUSTON	080285000	HARRIS	SAN JACINTO
HOUSTON	080285000	HARRIS	SAN JACINTO-BRAZOS
HOUSTON	080285000	MONTGOMERY	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Houston Indirect Reuse (Tech Memo 4B-31)			
SOURCES	SOURCE ID	COUNTY	BASIN
INDIRECT REUSE HARRIS COUNTY	3510101	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
HOUSTON	080285000	HARRIS	SAN JACINTO
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO
STEAM ELECTRIC POWER	081002101	HARRIS	SAN JACINTO-BRAZOS
MANUFACTURING	081001101	HARRIS	SAN JACINTO-BRAZOS
NHCRWA	088000000	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Wastewater Reuse for Industry (Tech Memo 4B-34)			
SOURCES	SOURCE ID	COUNTY	BASIN
WASTEWATER REUSE FOR INDUSTRY	3610101	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MANUFACTURING	081001101	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Houston Bayous Permit (Tech Memo 4B-37)			
SOURCES	SOURCE ID	COUNTY	BASIN
SAN JACINTO RUN-OF-RIVER HOUSTON BAYOUS	34UNPERMITTED	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN

Note: Supply from this strategy is not specifically allocated to Water User Groups. The strategy will divert interruptible water form four bayous in the San Jacinto Basin for municipal and industrial use when available.

El Dorado UD

El Dorado UD indicated on the survey that approximately $1.3 million will be needed to fund one future water management strategy project in 2011 and 2012. As a participant in the City of Houston GRP, El Dorado UD will require funds from the TWDB to expand its groundwater pumping capacity.

WATER MANAGEMENT STRATEGIES			
COH GRP (Tech Memo 4B-6)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	10115	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
EL DORADO UD	084101000	HARRIS	SAN JACINTO

Flo Community WSC

Flo Community WSC has two projects listed to start in 2010, and the district indicated on the survey that a total of $2,318,000 will be needed to expand their current groundwater capacity. $630,000 is requested through the State Participation Fund and $238,000 through the WIF-Deferred Program. $600,000 is requested from the rural category. $850,000 is requested from the acquisition and construction category.

WATER MANAGEMENT STRATEGIES			
Expanded Use of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
CARRIZO-WILCOX AQUIFER	14510	LEON	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
FLO COMMUNITY WSC	084114000	LEON	TRINITY

Fort Bend County MUDs #106, #108, #111, & #67

Fort Bend County MUDs #106, #108, #111, and #67 indicated that financial assistance for future projects is not needed.

Fountain View Subdivision

According to the survey submitted by Fountain View Subdivision, there are no plans in the future that will require financial assistance from TWDB.

Harris County FWSD #47

Harris County FWSD #47, located in the San Jacinto Basin, indicated that financial assistance for future projects is not needed for any of the five funding categories.

Harris County MUD #119 Inwood North

According to the survey submitted by Harris County MUD #119 Inwood North, they currently do not have future plans requiring financial assistance from TWDB.

Harris County MUD #189

Harris County MUD #189, located in the San Jacinto Basin, indicated that financial assistance for future projects is not needed in any of the five funding categories.

Harris County WCID #1

According the survey completed by Harris County WCID #1, the two future projects are the BAWA to WUG Contract and the reallocation for the existing supply. This district will not require financial assistance for future projects.

Harris County WCID #36

Harris County WCID #36 has three projects listed on the survey for 2010; the district indicated on the survey that there are no future plans for assistance from the TWDB.

Hempstead

In the survey, the City of Hempstead has one project listed as a WMS for 2010. Currently, Hempstead does not anticipate requesting financial assistance from the TWDB.

Hitchcock

The City of Hitchcock has two projects listed in the survey. The City anticipates requesting funding from the TWDB from the WIF Deferred and WIF Construction Programs in 2011 and 2012 respectively to expand the city's groundwater capacity. The City of Hitchcock also indicated that approximately $200,000 and $1,500,000 would be requested from the WIF Deferred Program and WIF Construction Program respectively to design and build infrastructure that would allow the city to expand its current surface water contract with the GCWA.

WATER MANAGEMENT STRATEGIES			
Expanded Use of Groundwater (Tech Memo 4B-8)			
Sources:	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	08415	GALVESTON	SAN JACINTO-BRAZOS
Water User Groups:	WUG ID	COUNTY	BASIN
HITCHCOCK	80279000	GALVESTON COUNTY	SAN JACINTO-BRAZOS

WATER MANAGEMENT STRATEGIES			
GCWA To WUG Contract (Tech Memo 4B-6)			
Sources:	SOURCE ID	COUNTY	BASIN
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	3461105357A	BRAZORIA	SAN JACINTO-BRAZOS
BRAZOS RIVER RUN-OF-RIVER	3461205322B	FORT BEND	BRAZOS
BRA MAIN STEM STYSTEM	120E0	RESERVOIR	BRAZOS
Water User Groups:	WUG ID	COUNTY	BASIN
HITCHCOCK	80279000	GALVESTON COUNTY	SAN JACINTO-BRAZOS

Huntsville

Huntsville is located in Walker County and has one project listed in the survey starting in 2010. Huntsville has indicated there is need for loan assistance in the years 2015, 2020 and 2035. Huntsville anticipates a water treatment plant (see table) as a future water management strategy and has requested a grant for $61,000,000. This grant will be dispersed in three of five funding programs. Huntsville requested $8,000,000, $51,000,000, and $2,000,000 from the WIF-Deferred Program, WIF-Construction Program and the State Participation Program, respectively.

WATER MANAGEMENT STRATEGIES			
Huntsville WTP (Tech Memo 4B-41)			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
HUNTSVILLE	080292000	WALKER	TRINITY
HUNTSVILLE	080292000	WALKER	SAN JACINTO

Jersey Village

Jersey Village has one project listed on the survey for 2010, and the district indicated that no future water infrastructure projects are planned. Therefore, financial assistance will not be needed from the TWDB.

Kendleton

The City of Kendleton has one project listed on the survey that requires future funding from the TWDB. The year of need for the Expanded Use of Groundwater project is 2010. Kendleton has indicated that this project should be assigned to the Economically Distressed Areas Program. The amount requested is $914,183. The project will allow the City of Kendleton to increase its supply from the Gulf Coast Aquifer in the Brazos-Colorado Basin in Fort Bend County.

WATER MANAGEMENT STRATEGIES			
Expanded Use of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	07915	FORT BEND	BRAZOS-COLORADO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
KENDLETON	KENDLETON	FORT BEND	BRAZOS-COLORADO

Lake Livingston Water Supply & Sewer Service Company

Lake Livingston Water Supply & Sewer Service Company, which is located in Polk County, completed the survey and did not indicate any future plans for the entity for their ground water expanded use project.

Montgomery County MUD #19

Montgomery County MUD #19 has two projects listed on the survey for 2010, and the district indicated on the survey that there are no future plans for financial assistance from the TWDB.

Montgomery County MUD #8

Montgomery County MUD #8 has four projects listed as future water management strategies. The district indicated on the survey that a total of $5,837,866 will be requested to fund the Montgomery County MUDs 8&9 Reuse Project. $1,284,100 is requested through the WIF-Deferred Program in 2011 and $4,553,766 through the WIF-Construction Program in 2013.

WATER MANAGEMENT STRATEGIES			
Montgomery County MUDs 8 and 9 Reuse (Tech Memo 4B-32)			
SOURCES	SOURCE ID	COUNTY	BASIN
INDIRECT REUSE	3610170	MONTGOMERY	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MONTGOMERY COUNTY MUD #8	084263000	MONTGOMERY	SAN JACINTO
MONTGOMERY COUNTY MUD #9	084264000	MONTGOMERY	SAN JACINTO

Montgomery County MUD #9

Montgomery County MUD #9 included five projects listed as future water management strategies. The district indicated on the survey that a total of $6,407,821 will be requested to fund the Montgomery County MUDs 8&9 Reuse Project. $1,284,100 is requested through the WIF-Deferred Program in 2011 and $5,123,721 through the WIF-Construction Program in 2013.

WATER MANAGEMENT STRATEGIES			
Montgomery County MUDs 8 and 9 Reuse (Tech Memo 4B-32)			
SOURCES	SOURCE ID	COUNTY	BASIN
INDIRECT REUSE	3610170	MONTGOMERY	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
MONTGOMERY COUNTY MUD #8	084263000	MONTGOMERY	SAN JACINTO
MONTGOMERY COUNTY MUD #9	084264000	MONTGOMERY	SAN JACINTO

North Fort Bend Water Authority

The North Fort Bend Water Authority (NFBWA), located in Fort Bend County, has seven projects listed as future water management strategies. The entity indicated there are projects that will require funding as early as 2010 and as late as 2030. NFBWA requested $512,940,100 for all the projects identified on the survey. The table below summarizes the use of funding requested from each loan program.

PROJECT NAME	FUNDING TYPE				
	WIF-Deferred Program	WIF-Construction Program	State Participation Program	Rural Water Assistance Program	Economically Distressed Areas Program
Expanded Use of GW	$1,859,327 (2010)	$10,536,183 (2010)	0	0	0
Municipal Non Potable Re-Use	$1,019,530 (2010)	$5,777,340 (2010)	0	0	0
NFBWA 2025 Shared Transmission	$31,950,000 (2010)	$181,050,000 (2010)	0	0	0
NFBWA Internal Distribution	$109,000,000 (2010)	$116,000,000 (2020)	0	0	0
NFBWA to WUG Contract	$6,744,672 (2020)	$38,219,809 (2010)	0	0	0
Reallocate Existing Supply	$1,617,486 (2010)	$9,165,753 (2010)	0	0	0

The projects identified in the survey include the NFBWA 2025 Shared Transmission, Internal Distribution, NFBWA to WUG Contract and Reallocation of Existing Supply. All of the projects involve transferring Lake Livingston water contracted from the City of Houston to various areas of Fort Bend County. Another water management strategy is Expanded Use of Groundwater in which NFBWA will be able to increase its supply from the Gulf Coast Aquifer. Municipal Non-Potable Reuse is a water management strategy which will reuse municipal wastewater from local sources for municipal irrigation. The following tables provide the sources and Water User Group information for the funding requested from the TWDB.

WATER MANAGEMENT STRATEGIES			
NFBWA 2025 Shared Transmission (W/ WHCRWA) (Tech Memo 4B-22) **NFBWA Internal Distribution (Tech Memo 4B-22)** **NFBWA To WUG Contract (Tech Memo 4B-6)** **Reallocate Existing Supply (Tech Memo 4B-6)**			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NFBWA	NFBWA	FORT BEND	BRAZOS
NFBWA	NFBWA	FORT BEND	SAN JACINTO
NFBWA	NFBWA	FORT BEND	SAN JACINTO-BRAZOS
NFBWA	NFBWA	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Expanded Use Of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	07915	FORT BEND	BRAZOS
GULF COAST AQUIFER	07915	FORT BEND	SAN JACINTO
GULF COAST AQUIFER	07915	FORT BEND	SAN JACINTO-BRAZOS
GULF COAST AQUIFER	10115	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NFBWA	NFBWA	FORT BEND	BRAZOS
NFBWA	NFBWA	FORT BEND	SAN JACINTO
NFBWA	NFBWA	FORT BEND	SAN JACINTO-BRAZOS
NFBWA	NFBWA	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Municipal Non-Potable Reuse (Tech Memo 4B-35)			
SOURCES	SOURCE ID	COUNTY	BASIN
MUNICIPAL NON-POTABLE REUSE	07915	FORT BEND	BRAZOS
MUNICIPAL NON-POTABLE REUSE	07915	FORT BEND	SAN JACINTO
MUNICIPAL NON-POTABLE REUSE	07915	FORT BEND	SAN JACINTO-BRAZOS
MUNICIPAL NON-POTABLE REUSE	10115	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NFBWA	NFBWA	FORT BEND	BRAZOS
NFBWA	NFBWA	FORT BEND	SAN JACINTO
NFBWA	NFBWA	FORT BEND	SAN JACINTO-BRAZOS
NFBWA	NFBWA	HARRIS	SAN JACINTO

North Green MUD

North Green MUD of Harris County has one project listed on the survey for 2010. The MUD will not require financial assistance from the TWDB for future developments.

North Harris County Regional Water Authority

North Harris County Regional Water Authority, which is located in Harris County, has seven projects listed in the IFR survey. NHCRWA has identified the WIF-Deferred Program and the WIF-Construction Program for future financial assistance from TWDB. The table below identifies the level of assistance for each project. The sources and WUGs for each project along with the number of the water management strategy technical memorandum are listed below.

PROJECT NAME	FUNDING TYPE				
	WIF-Deferred Program	WIF-Construction Program	State Participation Program	Rural Water Assistance Fund Program	Economically Distressed Areas Program
NHCRWA Internal Distribution	$80,382,212 (2011)	$455,499,204 (2013)	0	0	0
NHCRWA Transmission	$37,987,370 (2011)	$215,261,766 (2013)	0	0	0
Houston Indirect Reuse	$22,062,146 (2033)	$125,018,827 (2035)	0	0	0
NHCRWA Indirect Reuse	$10,016,804 (2033)	$56,761,890 (2035)	0	0	0
Municipal Non-Potable Reuse	$647,139 (2023)	$3,667,121 (2025)	0	0	0
NHCRWA to WUG Contract	$9,689,282 (2011)	$54,905,929 (2013)	0	0	0

WATER MANAGEMENT STRATEGIES

NHCRWA Internal Distribution (Tech Memo 4B-23)
NHCRWA Transmission (Tech Memo 4B-23)
NHCRWA to WUG Contract (Tech Memo 4B-6)

SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
LAKE HOUSTON	10060	RESERVOIR	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NHCRWA	088000000	HARRIS	SAN JACINTO

Note: The NHCRWA Internal Distribution and Transmission Strategies are both separated into three strategies for 2010, 2020 and 2030 to represent the phased construction of the regional water supply system.

WATER MANAGEMENT STRATEGIES

Houston Indirect Reuse (Tech Memo 4B-31)

SOURCES	SOURCE ID	COUNTY	BASIN
INDIRECT REUSE HARRIS COUNTY	3510101	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NHCRWA	088000000	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES

NHCRWA Indirect Reuse (Tech Memo 4B-33)

SOURCES	SOURCE ID	COUNTY	BASIN
INDIRECT REUSE HARRIS COUNTY	3510101	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NHCRWA	088000000	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Municipal Non-Potable Reuse (Tech Memo 4B-35)			
SOURCES	SOURCE ID	COUNTY	BASIN
DIRECT REUSE	3610101	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NHCRWA	088000000	HARRIS	SAN JACINTO

Northwest Harris County MUD 23

Northwest Harris County MUD 23 has identified one project on the survey that needs $2,425,000 of financial assistance for the future. About $1,265,000 is requested through the WIF-Deferred Program and $975,000 is requested through the WIF-Construction Program. This entity will also be requesting funding through the State Participation Program. The project will allow the MUD to increase its supply from the Gulf Coast Aquifer in the San Jacinto Basin in Harris County.

WATER MANAGEMENT STRATEGIES			
NHCRWA GRP Participation (Tech Memo 4B-6)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	10115	RESERVOIR	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
NORTHWEST HARRIS COUNTY MUD 23	NORTHWEST HARRIS COUNTY MUD 23	HARRIS	SAN JACINTO

San Jacinto WSC

San Jacinto WSC has one project listed for 2010, and the district indicated on the survey that a total of $426,514 will be needed to expand their current groundwater capacity. About $326,000 is requested through the State Participation Program and $100,000 through the WIF-Deferred Program. The project will allow San Jacinto WSC to increase its supply from the Gulf Coast Aquifer.

WATER MANAGEMENT STRATEGIES			
Expanded Use Of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	20415	SAN JACINTO	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
SAN JACINTO WSC	084328000	SAN JACINTO	TRINITY

City of Sealy

The City of Sealy is located in Austin County and is projecting an increased interest for residential, commercial and industrial developments. Sealy is expected to experience substantial population growth in the upcoming years; however, the current water system will be unable to accommodate increased growth. Sealy is requesting assistance from the TWDB for the design and construction of two groundwater pumping plants that will consist of new groundwater wells, ground storage tanks and control buildings. The new water plants will be essential to provide adequate water supplies from the Gulf Coast Aquifer in Austin County to new developments. The estimated cost for the new well, water plant, engineering fees and other appurtenances will total $6,450,000.

WATER MANAGEMENT STRATEGIES			
Sealy Groundwater Treatment Expansion (Tech Memo 4B-51)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	00815	AUSTIN	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN
SEALY	080549000	AUSTIN	BRAZOS

Simonton

Simonton has one project listed on the survey for 2010, and the district indicated on the survey that there are no future plans; therefore, financial assistance will not be needed from the TWDB.

Southern Montgomery County MUD

Southern Montgomery County MUD has two projects listed on the survey for 2010, and the district indicated on the survey that are no future plans; therefore, financial assistance will not be needed from the TWDB.

Spring Creek UD

Spring Creek UD has three projects listed on the survey for 2010, and the district indicated on the survey that there are no future plans; therefore, financial assistance will not be needed from the TWDB.

Stagecoach

The IFR Survey lists three projects for the City of Stagecoach beginning in the Year 2010. Stagecoach does not plan to request financial assistance from the TWDB during the current planning period.

Stanley Lake MUD

Stanley Lake MUD, lists three identified projects potentially requiring outside funding; however, Stanley Lake MUD does not intend to apply for any grants for the future water management strategies.

Sugar Land

According to the survey, there are two future projects listed for the City of Sugar Land. Sugar Land responded to the survey indicating the City will need approximately $16 million for financial assistance. Sugar Land has identified Sugar Land GRP Reuse as a future project scheduled to begin in 2012 and has requested $520,000 through the WIF-Deferred Program. Another project (Sugar Land GRP) would require $19.6 million through the WIF Construction Program. The sources and projected water user groups for the two projects are listed on the following table.

WATER MANAGEMENT STRATEGIES			
Sugar Land GRP Participation (Tech Memo 4B-16)			
SOURCES	SOURCE ID	COUNTY	BASIN
GULF COAST AQUIFER	07915	FORT BEND	SAN JACINTO-BRAZOS
GULF COAST AQUIFER	07915	FORT BEND	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN
SUGAR LAND	080585000	FORT BEND	SAN JACINTO-BRAZOS
SUGAR LAND	080585000	FORT BEND	BRAZOS
COUNTY-OTHER	080757079	FORT BEND	SAN JACINTO-BRAZOS
COUNTY-OTHER	080757079	FORT BEND	BRAZOS
PLANTATION MUD	084303000	FORT BEND	SAN JACINTO-BRAZOS
FORT BEND COUNTY MUD #106	084117000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #111	084119000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #67	084126000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #68	084127000	FORT BEND	BRAZOS
FORT BEND COUNTY MUD #69	084128000	FORT BEND	BRAZOS

WATER MANAGEMENT STRATEGIES			
Sugar Land GRP Reuse (Tech Memo 4B-16)			
SOURCES	SOURCE ID	COUNTY	BASIN
SUGAR LAND GRP REUSE	SLGR	FORT BEND	BRAZOS
WATER USER GROUPS	WUG ID	COUNTY	BASIN
SUGAR LAND	080585000	FORT BEND	BRAZOS

Walker County Rural WSC

Walker County Rural WSC has one project listed for 2012, and the district indicated that a total of $344,031 will be needed to increase the district's capacity for pumping groundwater from the Sparta Aquifer in Walker County. The entire amount is requested through the WIF-Deferred Program.

WATER MANAGEMENT STRATEGIES			
Expanded Use Of Groundwater (Tech Memo 4B-8)			
SOURCES	SOURCE ID	COUNTY	BASIN
SPARTA AQUIFER	23627	WALKER	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
WALKER COUNTY RURAL WSC	084372000	WALKER	TRINITY

West Harris County Regional Water Authority

Five water management strategies are listed for the West Harris County Regional Water Authority (WHCRWA) in the IFR survey. Four of the projects will require financial assistance from TWDB. The table below illustrates the total assistance requested for WHCRWA's water management strategies along with the funding categories and the dates that the funds will be requested.

PROJECT NAME	FUNDING TYPE				
	WIF-Deferred Program	WIF-Construction Program	State Participation Program	Rural Water Assistance Program	Economically Distressed Areas Program
WHCRWA Internal Distribution	$31,820,000 (2012)	$304,732,726 (2013)	0	0	0
WHCRWA 2020 Shared Transmission (w/NFBWA)	$41,717,700 (2010)	$229,540,668 (2014)	0	0	0
Municipal Non Potable Re-Use	$80,000 (2015)	$341,675 (2017)	0	0	0
WHCRWA to WUG Contract	0	$89,507,274 (2013)	0	0	0

The WHCRWA internal distribution, transmission and WHCRWA to WUG contract strategies involve the physical transfer of Lake Livingston water from the City of Houston to areas in west Harris County. The Trinity River Basin supplies will also allow the WHCRWA to over-convert some areas to surface water, allowing other member districts to remain on groundwater. These member districts include: Katy, Harris County MUD 132, Harris County MUD 151, Harris County MUD 152, Harris County MUD 180, Harris County MUD 146 and Trail of Lakes MUD. The other water management strategy for the WHCRWA, municipal non-potable reuse, will reuse municipal wastewater from local sources for municipal irrigation. The source and water user group information for the recommended projects is listed in the following tables.

WATER MANAGEMENT STRATEGIES			
WHCRWA Internal Distribution (Tech Memo 4B-25) **WHCRWA 2020 Shared Transmission (w/ NFBWA) (Tech Memo 4B-25)** **WHCRWA to WUG Contract - Lake Livingston (Tech Memo 4B-6)**			
SOURCES	SOURCE ID	COUNTY	BASIN
LIVINGSTON-WALLISVILLE SYSTEM	084H0	RESERVOIR	TRINITY
WATER USER GROUPS	WUG ID	COUNTY	BASIN
WHCRWA	088002000	FORT BEND	SAN JACINTO
WHCRWA	088002000	HARRIS	SAN JACINTO

WATER MANAGEMENT STRATEGIES			
Municipal Non-Potable Reuse (Tech Memo 4B-35)			
SOURCES	SOURCE ID	COUNTY	BASIN
MUNICIPAL NON-POTABLE REUSE	MNPR	FORT BEND	SAN JACINTO
MUNICIPAL NON-POTABLE REUSE	MNPR	HARRIS	SAN JACINTO
WATER USER GROUPS	WUG ID	COUNTY	BASIN
WHCRWA	088002000	FORT BEND	SAN JACINTO
WHCRWA	088002000	HARRIS	SAN JACINTO

9.3.2 Summary of Survey Results

Altogether, forty WUGs and WWPs responded to the survey, indicating the level of funding needed for future programs. The type of projects that the WUGs will require financial assistance from TWDB included increased contractual supplies, expanded use of groundwater, water treatment plants, water transfer, etc. The cumulative total of financial assistance needed to carry out these types of projects is $6,110,182,058. The WIF-Construction Program garnered the most applicants. Entities requested $5,021,977,795 in loans and grants from the TWDB through this program. The projects identified in the survey anticipate funding will be required as early as 2010 and as late as 2056. $915,663,429 is requested through of the WIF-Deferred Program. Based on the survey responses, $171,026,651 should be allocated from the State Participation Program. WUGs also requested $914,183 and $600,000 from the Economically Distressed Area Program and the Rural Water Assistance Program, respectively.

Table 9-3

Summary of Survey Results

Funding Type	Funding Requested ($)
WIF-Deferred Program	$915,663,429
WIF-Construction Program	$5,021,977,795
State Participation Program	$171,026,651
Rural Water Assistance Program	$600,000
Economically Distressed Areas Program	$914,183
Total	$6,110,182,058

This Page

Intentionally Left Blank

Appendix 9A

Tabulated Survey Results

This Page Intentionally
Left Blank

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
1104	181	AMES	WUG	H	LIBERTY	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/15/10 12:16 PM
1105	181	AMES	WUG	H	LIBERTY	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/15/10 12:16 PM
1106	181	AMES	WUG	H	LIBERTY	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/15/10 12:16 PM
1223	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	PLANNING, DESIGN, AND PERMITTING	717	ALLENS CREEK RESERVOIR	$ -	2010	7/16/10 3:29 PM
1224	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	ACQUISITION AND CONSTRUCTION	717	ALLENS CREEK RESERVOIR	$ 15,000,000.00	2015	7/16/10 3:29 PM
1225	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	EXCESS CAPACITY	717	ALLENS CREEK RESERVOIR	$ 15,000,000.00	2017	7/16/10 3:29 PM
1226	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	RURAL	717	ALLENS CREEK RESERVOIR	$ -	2010	7/16/10 3:29 PM
1227	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	DISADVANTAGED	717	ALLENS CREEK RESERVOIR	$ -	2010	7/16/10 3:29 PM
1233	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	PLANNING, DESIGN, AND PERMITTING	729	BRAZOS SALTWATER BARRIER	$ -	2010	7/16/10 3:29 PM
1234	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	ACQUISITION AND CONSTRUCTION	729	BRAZOS SALTWATER BARRIER	$ 35,000,000.00	2020	7/16/10 3:29 PM
1235	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	EXCESS CAPACITY	729	BRAZOS SALTWATER BARRIER	$ -	2010	7/16/10 3:29 PM
1236	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	RURAL	729	BRAZOS SALTWATER BARRIER	$ -	2010	7/16/10 3:29 PM
1237	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	DISADVANTAGED	729	BRAZOS SALTWATER BARRIER	$ -	2010	7/16/10 3:29 PM
1258	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	PLANNING, DESIGN, AND PERMITTING	785	FREEPORT DESALINATION	$ -	2010	7/16/10 3:29 PM
1259	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	ACQUISITION AND CONSTRUCTION	785	FREEPORT DESALINATION	$ 255,000,000.00	2040	7/16/10 3:29 PM
1260	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	EXCESS CAPACITY	785	FREEPORT DESALINATION	$ -	2010	7/16/10 3:29 PM
1261	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	RURAL	785	FREEPORT DESALINATION	$ -	2010	7/16/10 3:29 PM
1262	14	BRAZOS RIVER AUTHORITY	WWP	G	N/A	N/A	DISADVANTAGED	785	FREEPORT DESALINATION	$ -	2010	7/16/10 3:29 PM
1177	309	BUFFALO	WUG	H	LEON	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/16/10 11:07 AM
1178	309	BUFFALO	WUG	H	LEON	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/16/10 11:07 AM
1179	309	BUFFALO	WUG	H	LEON	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/16/10 11:07 AM
1180	309	BUFFALO	WUG	H	LEON	TRINITY	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/16/10 11:07 AM
1181	309	BUFFALO	WUG	H	LEON	TRINITY	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/16/10 11:07 AM
864	28	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	WWP	H	N/A	N/A	PLANNING, DESIGN, AND PERMITTING	704	CLCND WEST CHAMBERS COUNTY SYSTEM	$ 2,000,000.00	2012	6/30/10 8:53 AM
865	28	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	WWP	H	N/A	N/A	ACQUISITION AND CONSTRUCTION	704	CLCND WEST CHAMBERS COUNTY SYSTEM	$ 18,380,000.00	2015	6/30/10 8:53 AM
866	28	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	WWP	H	N/A	N/A	EXCESS CAPACITY	704	CLCND WEST CHAMBERS COUNTY SYSTEM	$ -	2010	6/30/10 8:53 AM
867	28	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	WWP	H	N/A	N/A	RURAL	704	CLCND WEST CHAMBERS COUNTY SYSTEM	$ -	2010	6/30/10 8:53 AM
868	28	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	WWP	H	N/A	N/A	DISADVANTAGED	704	CLCND WEST CHAMBERS COUNTY SYSTEM	$ -	2010	6/30/10 8:53 AM
2303	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	717	ALLENS CREEK RESERVOIR	$ 30,000,000.00	2017	8/19/10 7:46 AM
2304	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	717	ALLENS CREEK RESERVOIR	$ 100,000,000.00	2018	8/19/10 7:47 AM
2305	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	717	ALLENS CREEK RESERVOIR	$ 25,926,680.00	2018	8/19/10 7:47 AM
2306	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	717	ALLENS CREEK RESERVOIR	$ -	2010	8/19/10 7:47 AM
2307	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	717	ALLENS CREEK RESERVOIR	$ -	2010	8/19/10 7:47 AM
2293	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	706	COH DISTRIBUTION EXPANSION	$ 39,156,000.00	2010	8/19/10 7:46 AM
2294	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	706	COH DISTRIBUTION EXPANSION	$ 221,884,000.00	2010	8/19/10 7:46 AM
2295	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	706	COH DISTRIBUTION EXPANSION	$ -	2010	8/19/10 7:46 AM
2296	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	706	COH DISTRIBUTION EXPANSION	$ -	2010	8/19/10 7:46 AM
2297	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	706	COH DISTRIBUTION EXPANSION	$ -	2010	8/19/10 7:46 AM
2288	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	705	COH TREATMENT EXPANSION	$ 306,850,824.00	2013	8/19/10 7:46 AM
2289	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	705	COH TREATMENT EXPANSION	$ 1,738,821,337.00	2014	8/19/10 7:46 AM
2290	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	705	COH TREATMENT EXPANSION	$ -	2010	8/19/10 7:46 AM
2291	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	705	COH TREATMENT EXPANSION	$ -	2010	8/19/10 7:46 AM
2292	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	705	COH TREATMENT EXPANSION	$ -	2010	8/19/10 7:46 AM
2283	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ 363,154.00	2015	8/19/10 7:46 AM
2284	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ 2,057,875.00	2016	8/19/10 7:46 AM
2285	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	8/19/10 7:46 AM
2286	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	678	EXPANDED USE OF GW	$ -	2010	8/19/10 7:46 AM
2287	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	8/19/10 7:46 AM
2318	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	727	HOUSTON BAYOUS PERMIT	$ 3,143,400.00	2020	8/19/10 7:47 AM
2319	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	727	HOUSTON BAYOUS PERMIT	$ 17,812,600.00	2020	8/19/10 7:47 AM
2320	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	727	HOUSTON BAYOUS PERMIT	$ -	2010	8/19/10 7:47 AM
2321	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	727	HOUSTON BAYOUS PERMIT	$ -	2010	8/19/10 7:47 AM
2322	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	727	HOUSTON BAYOUS PERMIT	$ -	2010	8/19/10 7:47 AM
2308	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	721	HOUSTON INDIRECT REUSE	$ 45,907,933.00	2035	8/19/10 7:47 AM
2309	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	721	HOUSTON INDIRECT REUSE	$ 260,144,951.00	2036	8/19/10 7:47 AM
2310	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	721	HOUSTON INDIRECT REUSE	$ -	2010	8/19/10 7:47 AM
2311	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	721	HOUSTON INDIRECT REUSE	$ -	2010	8/19/10 7:47 AM
2312	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	721	HOUSTON INDIRECT REUSE	$ -	2010	8/19/10 7:47 AM
2298	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	709	LUCE BAYOU	$ 38,087,537.00	2011	8/19/10 7:46 AM
2299	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	709	LUCE BAYOU	$ 88,870,920.00	2014	8/19/10 7:46 AM
2300	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	709	LUCE BAYOU	$ 126,958,457.00	2010	8/19/10 7:46 AM
2301	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	709	LUCE BAYOU	$ -	2010	8/19/10 7:46 AM
2302	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	709	LUCE BAYOU	$ -	2010	8/19/10 7:46 AM
2313	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	724	WASTEWATER REUSE FOR INDUSTRY	$ 49,807,764.00	2055	8/19/10 7:47 AM
2314	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	724	WASTEWATER REUSE FOR INDUSTRY	$ 282,243,997.00	2056	8/19/10 7:47 AM
2315	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	724	WASTEWATER REUSE FOR INDUSTRY	$ -	2010	8/19/10 7:47 AM
2316	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	RURAL	724	WASTEWATER REUSE FOR INDUSTRY	$ -	2010	8/19/10 7:47 AM
2317	76	HOUSTON	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	724	WASTEWATER REUSE FOR INDUSTRY	$ -	2010	8/19/10 7:47 AM
1197	748	EL DORADO UD	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	683	COH GRP PARTICIPATION	$ 161,612.00	2011	7/16/10 1:55 PM
1198	748	EL DORADO UD	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	683	COH GRP PARTICIPATION	$ 1,077,412.00	2012	7/16/10 1:55 PM
1199	748	EL DORADO UD	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	683	COH GRP PARTICIPATION	$ -	2010	7/16/10 1:55 PM
1200	748	EL DORADO UD	WUG	H	HARRIS	SAN JACINTO	RURAL	683	COH GRP PARTICIPATION	$ -	2010	7/16/10 1:55 PM
1201	748	EL DORADO UD	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	683	COH GRP PARTICIPATION	$ -	2010	7/16/10 1:55 PM
1268	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ 38,000.00	2011	7/16/10 5:01 PM
1269	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ 100,000.00	2011	7/16/10 5:01 PM
1270	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ 130,000.00	2011	7/16/10 5:01 PM
1271	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	RURAL	678	EXPANDED USE OF GW	$ 100,000.00	2011	7/16/10 5:01 PM
1272	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/16/10 5:01 PM
1263	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	PLANNING, DESIGN, AND PERMITTING	307	SUPPLEMENTAL WELLS	$ 200,000.00	2011	7/16/10 5:01 PM
1264	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	ACQUISITION AND CONSTRUCTION	307	SUPPLEMENTAL WELLS	$ 750,000.00	2011	7/16/10 5:01 PM

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
1265	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	EXCESS CAPACITY	307	SUPPLEMENTAL WELLS	$ 500,000.00	2011	7/16/10 5:01 PM
1266	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	RURAL	307	SUPPLEMENTAL WELLS	$ 500,000.00	2011	7/16/10 5:01 PM
1267	782	FLO COMMUNITY WSC	WUG	H	LEON	TRINITY	DISADVANTAGED	307	SUPPLEMENTAL WELLS	$ -	2010	7/16/10 5:01 PM
899	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	7/6/10 10:58 AM
900	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	7/6/10 10:58 AM
901	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	7/6/10 10:58 AM
902	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	RURAL	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	7/6/10 10:58 AM
903	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	7/6/10 10:58 AM
904	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	7/6/10 10:58 AM
905	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	7/6/10 10:58 AM
906	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	7/6/10 10:58 AM
907	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	RURAL	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	7/6/10 10:58 AM
908	790	FORT BEND COUNTY MUD #106	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	7/6/10 10:58 AM
2208	791	FORT BEND COUNTY MUD #108	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	8/17/10 1:20 PM
2209	791	FORT BEND COUNTY MUD #108	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	8/17/10 1:20 PM
2210	791	FORT BEND COUNTY MUD #108	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	8/17/10 1:20 PM
2211	791	FORT BEND COUNTY MUD #108	WUG	H	FORT BEND	BRAZOS	RURAL	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	8/17/10 1:20 PM
2212	791	FORT BEND COUNTY MUD #108	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	8/17/10 1:20 PM
614	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:38 PM
615	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:38 PM
616	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:38 PM
617	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	RURAL	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:38 PM
618	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:38 PM
619	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:38 PM
620	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:38 PM
621	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:38 PM
622	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	RURAL	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:38 PM
623	792	FORT BEND COUNTY MUD #111	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:38 PM
604	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:36 PM
605	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:36 PM
606	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:36 PM
607	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	RURAL	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:36 PM
608	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	698	SUGAR LAND GRP PARTICIPATION	$ -	2010	6/9/10 3:36 PM
609	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:36 PM
610	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:36 PM
611	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:36 PM
612	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	RURAL	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:36 PM
613	799	FORT BEND COUNTY MUD #67	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	751	SUGAR LAND TO WUG CONTRACT	$ -	2010	6/9/10 3:36 PM
1208	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	737	COH TO WUG CONTRACT	$ -	2010	7/16/10 2:08 PM
1209	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	737	COH TO WUG CONTRACT	$ -	2010	7/16/10 2:08 PM
1210	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	737	COH TO WUG CONTRACT	$ -	2010	7/16/10 2:08 PM
1211	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	RURAL	737	COH TO WUG CONTRACT	$ -	2010	7/16/10 2:08 PM
1212	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	737	COH TO WUG CONTRACT	$ -	2010	7/16/10 2:08 PM
1203	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/16/10 2:08 PM
1204	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/16/10 2:08 PM
1205	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/16/10 2:08 PM
1206	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/16/10 2:08 PM
1207	809	FOUNTAINVIEW SUBDIVISION	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/16/10 2:08 PM
894	885	HARRIS COUNTY FWSD #47	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/6/10 10:29 AM
895	885	HARRIS COUNTY FWSD #47	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/6/10 10:29 AM
896	885	HARRIS COUNTY FWSD #47	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/6/10 10:29 AM
897	885	HARRIS COUNTY FWSD #47	WUG	H	HARRIS	SAN JACINTO	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/6/10 10:29 AM
898	885	HARRIS COUNTY FWSD #47	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/6/10 10:29 AM
594	889	HARRIS COUNTY MUD #119 INWOOD NORTH	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	683	COH GRP PARTICIPATION	$ -	2010	6/8/10 3:54 PM
595	889	HARRIS COUNTY MUD #119 INWOOD NORTH	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	683	COH GRP PARTICIPATION	$ -	2010	6/8/10 3:54 PM
596	889	HARRIS COUNTY MUD #119 INWOOD NORTH	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	683	COH GRP PARTICIPATION	$ -	2010	6/8/10 3:54 PM
597	889	HARRIS COUNTY MUD #119 INWOOD NORTH	WUG	H	HARRIS	SAN JACINTO	RURAL	683	COH GRP PARTICIPATION	$ -	2010	6/8/10 3:54 PM
598	889	HARRIS COUNTY MUD #119 INWOOD NORTH	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	683	COH GRP PARTICIPATION	$ -	2010	6/8/10 3:54 PM
740	898	HARRIS COUNTY MUD #189	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	683	COH GRP PARTICIPATION	$ -	2010	6/22/10 9:52 AM
741	898	HARRIS COUNTY MUD #189	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	683	COH GRP PARTICIPATION	$ -	2010	6/22/10 9:52 AM
742	898	HARRIS COUNTY MUD #189	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	683	COH GRP PARTICIPATION	$ -	2010	6/22/10 9:52 AM
743	898	HARRIS COUNTY MUD #189	WUG	H	HARRIS	SAN JACINTO	RURAL	683	COH GRP PARTICIPATION	$ -	2010	6/22/10 9:52 AM
744	898	HARRIS COUNTY MUD #189	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	683	COH GRP PARTICIPATION	$ -	2010	6/22/10 9:52 AM
1034	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	732	BAWA TO WUG CONTRACT	$ -	2010	7/13/10 2:53 PM
1035	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	732	BAWA TO WUG CONTRACT	$ -	2010	7/13/10 2:53 PM
1036	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	732	BAWA TO WUG CONTRACT	$ -	2010	7/13/10 2:53 PM
1037	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	RURAL	732	BAWA TO WUG CONTRACT	$ -	2010	7/13/10 2:53 PM
1038	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	732	BAWA TO WUG CONTRACT	$ -	2010	7/13/10 2:53 PM
1029	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/13/10 2:53 PM
1030	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/13/10 2:53 PM
1031	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/13/10 2:53 PM
1032	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/13/10 2:53 PM
1033	911	HARRIS COUNTY WCID #1	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/13/10 2:53 PM
974	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/8/10 1:11 PM
975	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/8/10 1:11 PM
976	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/8/10 1:11 PM
977	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/8/10 1:11 PM
978	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/8/10 1:11 PM
969	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	744	NCWA TO WUG CONTRACT	$ -	2010	7/8/10 1:11 PM

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
970	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	744	NCWA TO WUG CONTRACT	$ -	2010	7/8/10 1:11 PM
971	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	744	NCWA TO WUG CONTRACT	$ -	2010	7/8/10 1:11 PM
972	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	RURAL	744	NCWA TO WUG CONTRACT	$ -	2010	7/8/10 1:11 PM
973	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	744	NCWA TO WUG CONTRACT	$ -	2010	7/8/10 1:11 PM
964	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/8/10 1:11 PM
965	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/8/10 1:11 PM
966	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/8/10 1:11 PM
967	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/8/10 1:11 PM
968	914	HARRIS COUNTY WCID #36	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/8/10 1:11 PM
1054	931	HEMPSTEAD	WUG	H	WALLER	BRAZOS	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/15/10 10:42 AM
1055	931	HEMPSTEAD	WUG	H	WALLER	BRAZOS	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/15/10 10:42 AM
1056	931	HEMPSTEAD	WUG	H	WALLER	BRAZOS	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/15/10 10:42 AM
1057	931	HEMPSTEAD	WUG	H	WALLER	BRAZOS	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/15/10 10:42 AM
1058	931	HEMPSTEAD	WUG	H	WALLER	BRAZOS	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/15/10 10:42 AM
1588	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ 337.00	2011	8/3/10 10:48 AM
1589	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ 2,020.00	2012	8/3/10 10:48 AM
1590	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	8/3/10 10:48 AM
1591	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	RURAL	678	EXPANDED USE OF GW	$ -	2010	8/3/10 10:48 AM
1592	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	8/3/10 10:48 AM
1593	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	741	GCWA TO WUG CONTRACT	$ 200,000.00	2011	8/3/10 10:48 AM
1594	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	741	GCWA TO WUG CONTRACT	$ 1,500,000.00	2012	8/3/10 10:48 AM
1595	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	EXCESS CAPACITY	741	GCWA TO WUG CONTRACT	$ -	2010	8/3/10 10:48 AM
1596	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	RURAL	741	GCWA TO WUG CONTRACT	$ -	2010	8/3/10 10:48 AM
1597	950	HITCHCOCK	WUG	H	GALVESTON	SAN JACINTO-BRAZOS	DISADVANTAGED	741	GCWA TO WUG CONTRACT	$ -	2010	8/3/10 10:48 AM
1064	78	HUNTSVILLE	BOTH	H	WALKER	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	708	HUNTSVILLE WTP	$ 8,000,000.00	2020	7/15/10 11:29 AM
1065	78	HUNTSVILLE	BOTH	H	WALKER	SAN JACINTO	ACQUISITION AND CONSTRUCTION	708	HUNTSVILLE WTP	$ 51,000,000.00	2015	7/15/10 11:29 AM
1066	78	HUNTSVILLE	BOTH	H	WALKER	SAN JACINTO	EXCESS CAPACITY	708	HUNTSVILLE WTP	$ 2,000,000.00	2035	7/15/10 11:29 AM
1067	78	HUNTSVILLE	BOTH	H	WALKER	SAN JACINTO	RURAL	708	HUNTSVILLE WTP	$ -	2010	7/15/10 11:29 AM
1068	78	HUNTSVILLE	BOTH	H	WALKER	SAN JACINTO	DISADVANTAGED	708	HUNTSVILLE WTP	$ -	2010	7/15/10 11:29 AM
929	1232	JERSEY VILLAGE	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	688	NHCRWA GRP PARTICIPATION	$ -	2010	7/7/10 3:17 PM
930	1232	JERSEY VILLAGE	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	688	NHCRWA GRP PARTICIPATION	$ -	2010	7/7/10 3:17 PM
931	1232	JERSEY VILLAGE	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	688	NHCRWA GRP PARTICIPATION	$ -	2010	7/7/10 3:17 PM
932	1232	JERSEY VILLAGE	WUG	H	HARRIS	SAN JACINTO	RURAL	688	NHCRWA GRP PARTICIPATION	$ -	2010	7/7/10 3:17 PM
933	1232	JERSEY VILLAGE	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	688	NHCRWA GRP PARTICIPATION	$ -	2010	7/7/10 3:17 PM
914	2674	KENDLETON	WUG	H	FORT BEND	BRAZOS-COLORADO	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/7/10 10:39 AM
915	2674	KENDLETON	WUG	H	FORT BEND	BRAZOS-COLORADO	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/7/10 10:39 AM
916	2674	KENDLETON	WUG	H	FORT BEND	BRAZOS-COLORADO	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/7/10 10:39 AM
917	2674	KENDLETON	WUG	H	FORT BEND	BRAZOS-COLORADO	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/7/10 10:39 AM
918	2674	KENDLETON	WUG	H	FORT BEND	BRAZOS-COLORADO	DISADVANTAGED	678	EXPANDED USE OF GW	$ 914,183.00	2010	7/7/10 10:39 AM
1024	1295	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	H	POLK	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/13/10 9:59 AM
1025	1295	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	H	POLK	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/13/10 9:59 AM
1026	1295	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	H	POLK	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/13/10 9:59 AM
1027	1295	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	H	POLK	TRINITY	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/13/10 9:59 AM
1028	1295	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	H	POLK	TRINITY	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2015	7/13/10 9:59 AM
689	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	6/14/10 1:50 PM
690	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	6/14/10 1:50 PM
691	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	6/14/10 1:50 PM
692	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	6/14/10 1:50 PM
693	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	6/14/10 1:50 PM
694	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	6/14/10 1:50 PM
695	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	6/14/10 1:50 PM
696	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	6/14/10 1:50 PM
697	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	6/14/10 1:50 PM
698	2076	MONTGOMERY COUNTY MUD #19	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	6/14/10 1:50 PM
1388	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:40 PM
1389	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:40 PM
1390	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:40 PM
1391	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:40 PM
1392	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:40 PM
1398	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	722	MUD 8 AND 9 REUSE	$ 1,284,100.00	2011	7/22/10 2:40 PM
1399	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	722	MUD 8 AND 9 REUSE	$ 4,553,766.00	2013	7/22/10 2:40 PM
1400	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:40 PM
1401	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:40 PM
1402	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:40 PM
1403	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:40 PM
1404	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:40 PM
1405	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:40 PM
1406	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:40 PM
1407	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:40 PM
1393	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:40 PM
1394	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:40 PM
1395	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:40 PM
1396	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:40 PM
1397	2077	MONTGOMERY COUNTY MUD #8	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:40 PM
1408	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/22/10 2:41 PM
1409	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/22/10 2:41 PM
1410	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/22/10 2:41 PM
1411	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/22/10 2:41 PM
1412	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/22/10 2:41 PM

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
1413	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:41 PM
1414	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:41 PM
1415	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:41 PM
1416	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:41 PM
1417	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	7/22/10 2:41 PM
1423	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	722	MUD 8 AND 9 REUSE	$ 1,284,100.00	2011	7/22/10 2:41 PM
1424	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	722	MUD 8 AND 9 REUSE	$ 5,123,721.00	2013	7/22/10 2:41 PM
1425	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:41 PM
1426	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:41 PM
1427	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	722	MUD 8 AND 9 REUSE	$ -	2010	7/22/10 2:41 PM
1428	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:41 PM
1429	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:41 PM
1430	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:41 PM
1431	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:41 PM
1432	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	750	SJRA TO WUG CONTRACT	$ -	2010	7/22/10 2:41 PM
1418	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:41 PM
1419	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:41 PM
1420	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:41 PM
1421	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:41 PM
1422	2078	MONTGOMERY COUNTY MUD #9	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	7/22/10 2:41 PM
1127	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ 1,859,327.00	2010	7/15/10 3:06 PM
1128	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ 10,536,183.00	2010	7/15/10 3:06 PM
1129	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/15/10 3:06 PM
1130	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/15/10 3:06 PM
1131	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/15/10 3:06 PM
1142	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	725	MUNICIPAL NON-POTABLE REUSE	$ 1,019,530.00	2010	7/15/10 3:06 PM
1143	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	725	MUNICIPAL NON-POTABLE REUSE	$ 5,777,340.00	2020	7/15/10 3:06 PM
1144	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/15/10 3:06 PM
1145	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/15/10 3:06 PM
1146	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/15/10 3:06 PM
1132	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	710	NFBWA 2025 SHARED TRANSMISSION (W/ WHCRWA)	$ 31,950,000.00	2010	7/15/10 3:06 PM
1133	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	710	NFBWA 2025 SHARED TRANSMISSION (W/ WHCRWA)	$ 181,050,000.00	2010	7/15/10 3:06 PM
1134	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	710	NFBWA 2025 SHARED TRANSMISSION (W/ WHCRWA)	$ -	2010	7/15/10 3:06 PM
1135	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	710	NFBWA 2025 SHARED TRANSMISSION (W/ WHCRWA)	$ -	2010	7/15/10 3:06 PM
1136	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	710	NFBWA 2025 SHARED TRANSMISSION (W/ WHCRWA)	$ -	2010	7/15/10 3:06 PM
1137	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	711	NFBWA INTERNAL DISTRIBUTION	$ 109,000,000.00	2010	7/15/10 3:06 PM
1138	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	711	NFBWA INTERNAL DISTRIBUTION	$ 116,000,000.00	2020	7/15/10 3:06 PM
1139	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	711	NFBWA INTERNAL DISTRIBUTION	$ -	2010	7/15/10 3:06 PM
1140	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	711	NFBWA INTERNAL DISTRIBUTION	$ -	2010	7/15/10 3:06 PM
1141	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	711	NFBWA INTERNAL DISTRIBUTION	$ -	2010	7/15/10 3:06 PM
1152	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	745	NFBWA TO WUG CONTRACT	$ 6,744,672.00	2020	7/15/10 3:06 PM
1153	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	745	NFBWA TO WUG CONTRACT	$ 38,219,809.00	2010	7/15/10 3:06 PM
1154	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	745	NFBWA TO WUG CONTRACT	$ -	2010	7/15/10 3:06 PM
1155	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	745	NFBWA TO WUG CONTRACT	$ -	2010	7/15/10 3:06 PM
1156	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	745	NFBWA TO WUG CONTRACT	$ -	2010	7/15/10 3:06 PM
1122	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ 1,617,486.00	2010	7/15/10 3:06 PM
1123	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ 9,165,753.00	2010	7/15/10 3:06 PM
1124	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/15/10 3:06 PM
1125	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/15/10 3:06 PM
1126	2678	NORTH FORT BEND WATER AUTHORITY	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	7/15/10 3:06 PM
1059	2134	NORTH GREEN MUD	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	683	COH GRP PARTICIPATION	$ -	2010	7/15/10 11:02 AM
1060	2134	NORTH GREEN MUD	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	683	COH GRP PARTICIPATION	$ -	2010	7/15/10 11:02 AM
1061	2134	NORTH GREEN MUD	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	683	COH GRP PARTICIPATION	$ -	2010	7/15/10 11:03 AM
1062	2134	NORTH GREEN MUD	WUG	H	HARRIS	SAN JACINTO	RURAL	683	COH GRP PARTICIPATION	$ -	2010	7/15/10 11:03 AM
1063	2134	NORTH GREEN MUD	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	683	COH GRP PARTICIPATION	$ -	2010	7/15/10 11:03 AM
1523	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	721	HOUSTON INDIRECT REUSE	$ 22,062,146.00	2033	7/29/10 11:02 AM
1524	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	721	HOUSTON INDIRECT REUSE	$ 125,018,827.00	2035	7/29/10 11:02 AM
1525	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	721	HOUSTON INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1526	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	721	HOUSTON INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1527	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	721	HOUSTON INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1533	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	725	MUNICIPAL NON-POTABLE REUSE	$ 647,139.00	2023	7/29/10 11:02 AM
1534	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	725	MUNICIPAL NON-POTABLE REUSE	$ 3,667,121.00	2025	7/29/10 11:02 AM
1535	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/29/10 11:02 AM
1536	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/29/10 11:02 AM
1537	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	7/29/10 11:02 AM
1528	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	723	NHCRWA INDIRECT REUSE	$ 10,016,804.00	2033	7/29/10 11:02 AM
1529	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	723	NHCRWA INDIRECT REUSE	$ 56,761,890.00	2035	7/29/10 11:02 AM
1530	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	723	NHCRWA INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1531	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	723	NHCRWA INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1532	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	723	NHCRWA INDIRECT REUSE	$ -	2010	7/29/10 11:02 AM
1513	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	712	NHCRWA INTERNAL 2010 DISTRIBUTION	$ 80,382,212.00	2011	7/29/10 11:02 AM
1514	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	712	NHCRWA INTERNAL 2010 DISTRIBUTION	$ 455,499,204.00	2013	7/29/10 11:02 AM
1515	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	712	NHCRWA INTERNAL 2010 DISTRIBUTION	$ -	2010	7/29/10 11:02 AM
1516	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	712	NHCRWA INTERNAL 2010 DISTRIBUTION	$ -	2010	7/29/10 11:02 AM
1517	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	712	NHCRWA INTERNAL 2010 DISTRIBUTION	$ -	2010	7/29/10 11:02 AM
1543	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	746	NHCRWA TO WUG CONTRACT	$ 9,689,282.00	2011	7/29/10 11:02 AM
1544	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	746	NHCRWA TO WUG CONTRACT	$ 54,905,929.00	2013	7/29/10 11:02 AM
1545	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	746	NHCRWA TO WUG CONTRACT	$ -	2010	7/29/10 11:02 AM
1546	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	746	NHCRWA TO WUG CONTRACT	$ -	2010	7/29/10 11:02 AM

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
1547	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	746	NHCRWA TO WUG CONTRACT	$ -	2010	7/29/10 11:02 AM
1518	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	713	NHCRWA TRANSMISSION 2010	$ 37,987,370.00	2011	7/29/10 11:02 AM
1519	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	713	NHCRWA TRANSMISSION 2010	$ 215,261,766.00	2013	7/29/10 11:02 AM
1520	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	713	NHCRWA TRANSMISSION 2010	$ -	2010	7/29/10 11:02 AM
1521	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	713	NHCRWA TRANSMISSION 2010	$ -	2010	7/29/10 11:02 AM
1522	106	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	713	NHCRWA TRANSMISSION 2010	$ -	2010	7/29/10 11:02 AM
1633	2141	NORTHWEST HARRIS COUNTY MUD #23	WUG	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	688	NHCRWA GRP PARTICIPATION	$ 1,265,000.00	2015	8/3/10 12:15 PM
1634	2141	NORTHWEST HARRIS COUNTY MUD #23	WUG	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	688	NHCRWA GRP PARTICIPATION	$ 975,000.00	2015	8/3/10 12:15 PM
1635	2141	NORTHWEST HARRIS COUNTY MUD #23	WUG	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	688	NHCRWA GRP PARTICIPATION	$ 185,000.00	2011	8/3/10 12:15 PM
1636	2141	NORTHWEST HARRIS COUNTY MUD #23	WUG	H	HARRIS	SAN JACINTO	RURAL	688	NHCRWA GRP PARTICIPATION	$ -	2010	8/3/10 12:15 PM
1637	2141	NORTHWEST HARRIS COUNTY MUD #23	WUG	H	HARRIS	SAN JACINTO	DISADVANTAGED	688	NHCRWA GRP PARTICIPATION	$ -	2010	8/3/10 12:15 PM
624	2321	SAN JACINTO WSC	WUG	H	SAN JACINTO	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ 100,000.00	2010	6/11/10 7:14 AM
625	2321	SAN JACINTO WSC	WUG	H	SAN JACINTO	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	6/11/10 7:14 AM
626	2321	SAN JACINTO WSC	WUG	H	SAN JACINTO	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ 326,514.00	2010	6/11/10 7:14 AM
627	2321	SAN JACINTO WSC	WUG	H	SAN JACINTO	TRINITY	RURAL	678	EXPANDED USE OF GW	$ -	2010	6/11/10 7:14 AM
628	2321	SAN JACINTO WSC	WUG	H	SAN JACINTO	TRINITY	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	6/11/10 7:14 AM
1628	2341	SEALY	WUG	H	AUSTIN	BRAZOS	PLANNING, DESIGN, AND PERMITTING	894	SEALY GW TREATMENT EXPANSION	$ 700,000.00	2011	8/3/10 12:09 PM
1629	2341	SEALY	WUG	H	AUSTIN	BRAZOS	ACQUISITION AND CONSTRUCTION	894	SEALY GW TREATMENT EXPANSION	$ 5,750,000.00	2010	8/3/10 12:09 PM
1630	2341	SEALY	WUG	H	AUSTIN	BRAZOS	EXCESS CAPACITY	894	SEALY GW TREATMENT EXPANSION	$ -	2010	8/3/10 12:09 PM
1631	2341	SEALY	WUG	H	AUSTIN	BRAZOS	RURAL	894	SEALY GW TREATMENT EXPANSION	$ -	2010	8/3/10 12:09 PM
1632	2341	SEALY	WUG	H	AUSTIN	BRAZOS	DISADVANTAGED	894	SEALY GW TREATMENT EXPANSION	$ -	2010	8/3/10 12:09 PM
1473	2362	SIMONTON	WUG	H	FORT BEND	BRAZOS	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	7/27/10 2:40 PM
1474	2362	SIMONTON	WUG	H	FORT BEND	BRAZOS	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	7/27/10 2:40 PM
1475	2362	SIMONTON	WUG	H	FORT BEND	BRAZOS	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	7/27/10 2:40 PM
1476	2362	SIMONTON	WUG	H	FORT BEND	BRAZOS	RURAL	678	EXPANDED USE OF GW	$ -	2010	7/27/10 2:40 PM
1477	2362	SIMONTON	WUG	H	FORT BEND	BRAZOS	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	7/27/10 2:40 PM
1014	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	7/12/10 1:59 PM
1015	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	7/12/10 1:59 PM
1016	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	7/12/10 1:59 PM
1017	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	7/12/10 1:59 PM
1018	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	7/12/10 1:59 PM
1019	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	7/12/10 1:59 PM
1020	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	7/12/10 1:59 PM
1021	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	7/12/10 1:59 PM
1022	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	7/12/10 1:59 PM
1023	2381	SOUTHERN MONTGOMERY COUNTY MUD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	7/12/10 1:59 PM
1182	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	7/16/10 11:48 AM
1183	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	7/16/10 11:48 AM
1184	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	7/16/10 11:48 AM
1185	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	7/16/10 11:48 AM
1186	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	7/16/10 11:48 AM
1192	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	750	SJRA TO WUG CONTRACT	$ -	2010	7/16/10 11:48 AM
1193	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	750	SJRA TO WUG CONTRACT	$ -	2010	7/16/10 11:48 AM
1194	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	750	SJRA TO WUG CONTRACT	$ -	2010	7/16/10 11:48 AM
1195	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	750	SJRA TO WUG CONTRACT	$ -	2010	7/16/10 11:48 AM
1196	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	750	SJRA TO WUG CONTRACT	$ -	2010	7/16/10 11:48 AM
1187	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	7/16/10 11:48 AM
1188	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	7/16/10 11:48 AM
1189	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	7/16/10 11:48 AM
1190	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	7/16/10 11:48 AM
1191	2391	SPRING CREEK UD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	7/16/10 11:48 AM
820	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	6/24/10 2:20 PM
821	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ -	2010	6/24/10 2:20 PM
822	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	6/24/10 2:20 PM
823	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	678	EXPANDED USE OF GW	$ -	2010	6/24/10 2:20 PM
824	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	6/24/10 2:20 PM
825	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	6/24/10 2:20 PM
826	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	6/24/10 2:20 PM
827	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	6/24/10 2:20 PM
828	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	6/24/10 2:20 PM
829	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	6/24/10 2:20 PM
830	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	6/24/10 2:20 PM
831	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	6/24/10 2:20 PM
832	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	6/24/10 2:20 PM
833	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	6/24/10 2:20 PM
834	2676	STAGECOACH	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	6/24/10 2:20 PM
2338	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	679	INTERIM GROUNDWATER	$ -	2010	8/19/10 8:11 AM
2339	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	679	INTERIM GROUNDWATER	$ -	2010	8/19/10 8:11 AM
2340	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	679	INTERIM GROUNDWATER	$ -	2010	8/19/10 8:11 AM
2341	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	679	INTERIM GROUNDWATER	$ -	2010	8/19/10 8:11 AM
2342	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	679	INTERIM GROUNDWATER	$ -	2010	8/19/10 8:11 AM
2348	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	750	SJRA TO WUG CONTRACT	$ -	2010	8/19/10 8:11 AM
2349	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	750	SJRA TO WUG CONTRACT	$ -	2010	8/19/10 8:11 AM
2350	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	750	SJRA TO WUG CONTRACT	$ -	2010	8/19/10 8:11 AM
2351	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	750	SJRA TO WUG CONTRACT	$ -	2010	8/19/10 8:11 AM
2352	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	750	SJRA TO WUG CONTRACT	$ -	2010	8/19/10 8:11 AM
2343	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	696	SJRA WRAP PARTICIPATION	$ -	2010	8/19/10 8:11 AM
2344	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	ACQUISITION AND CONSTRUCTION	696	SJRA WRAP PARTICIPATION	$ -	2010	8/19/10 8:11 AM
2345	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	EXCESS CAPACITY	696	SJRA WRAP PARTICIPATION	$ -	2010	8/19/10 8:11 AM

IFRProjectData	EntityID	Name	Type	RWPG	County	Basin	Funding Type	DBProjectID	Project Name	Cost	Year of Need	Date Submitted
2346	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	RURAL	696	SJRA WRAP PARTICIPATION	$ -	2010	8/19/10 8:11 AM
2347	2399	STANLEY LAKE MUD	WUG	H	MONTGOMERY	SAN JACINTO	DISADVANTAGED	696	SJRA WRAP PARTICIPATION	$ -	2010	8/19/10 8:11 AM
841	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	697	SUGAR LAND GRP	$ -	2010	6/28/10 9:00 AM
842	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	697	SUGAR LAND GRP	$ 19,600,000.00	2011	6/28/10 9:00 AM
843	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	697	SUGAR LAND GRP	$ -	2010	6/28/10 9:00 AM
844	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	697	SUGAR LAND GRP	$ -	2010	6/28/10 9:00 AM
845	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	697	SUGAR LAND GRP	$ -	2010	6/28/10 9:00 AM
846	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	PLANNING, DESIGN, AND PERMITTING	699	SUGAR LAND GRP REUSE	$ 520,000.00	2012	6/28/10 9:00 AM
847	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	ACQUISITION AND CONSTRUCTION	699	SUGAR LAND GRP REUSE	$ -	2010	6/28/10 9:00 AM
848	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	EXCESS CAPACITY	699	SUGAR LAND GRP REUSE	$ -	2010	6/28/10 9:00 AM
849	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	RURAL	699	SUGAR LAND GRP REUSE	$ -	2010	6/28/10 9:00 AM
850	2493	SUGAR LAND	BOTH	H	FORT BEND	SAN JACINTO-BRAZOS	DISADVANTAGED	699	SUGAR LAND GRP REUSE	$ -	2010	6/28/10 9:00 AM
1623	2574	WALKER COUNTY RURAL WSC	WUG	H	WALKER	TRINITY	PLANNING, DESIGN, AND PERMITTING	678	EXPANDED USE OF GW	$ -	2010	8/3/10 11:32 AM
1624	2574	WALKER COUNTY RURAL WSC	WUG	H	WALKER	TRINITY	ACQUISITION AND CONSTRUCTION	678	EXPANDED USE OF GW	$ 344,031.00	2012	8/3/10 11:32 AM
1625	2574	WALKER COUNTY RURAL WSC	WUG	H	WALKER	TRINITY	EXCESS CAPACITY	678	EXPANDED USE OF GW	$ -	2010	8/3/10 11:32 AM
1626	2574	WALKER COUNTY RURAL WSC	WUG	H	WALKER	TRINITY	RURAL	678	EXPANDED USE OF GW	$ -	2010	8/3/10 11:32 AM
1627	2574	WALKER COUNTY RURAL WSC	WUG	H	WALKER	TRINITY	DISADVANTAGED	678	EXPANDED USE OF GW	$ -	2010	8/3/10 11:32 AM
1613	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	725	MUNICIPAL NON-POTABLE REUSE	$ 80,000.00	2015	8/3/10 11:26 AM
1614	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	725	MUNICIPAL NON-POTABLE REUSE	$ 341,675.00	2017	8/3/10 11:26 AM
1615	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	8/3/10 11:26 AM
1616	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	8/3/10 11:26 AM
1617	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	725	MUNICIPAL NON-POTABLE REUSE	$ -	2010	8/3/10 11:26 AM
1598	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	656	REALLOCATE EXISTING SUPPLY	$ -	2010	8/3/10 11:26 AM
1599	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	656	REALLOCATE EXISTING SUPPLY	$ -	2010	8/3/10 11:26 AM
1600	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	656	REALLOCATE EXISTING SUPPLY	$ -	2010	8/3/10 11:26 AM
1601	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	656	REALLOCATE EXISTING SUPPLY	$ -	2010	8/3/10 11:26 AM
1602	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	656	REALLOCATE EXISTING SUPPLY	$ -	2010	8/3/10 11:26 AM
1608	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	716	WHCRWA 2020 SHARED TRANSMISSION (W/ NFBWA)	$ 41,717,700.00	2010	8/3/10 11:26 AM
1609	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	716	WHCRWA 2020 SHARED TRANSMISSION (W/ NFBWA)	$ 229,540,668.00	2014	8/3/10 11:26 AM
1610	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	716	WHCRWA 2020 SHARED TRANSMISSION (W/ NFBWA)	$ -	2010	8/3/10 11:26 AM
1611	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	716	WHCRWA 2020 SHARED TRANSMISSION (W/ NFBWA)	$ -	2010	8/3/10 11:26 AM
1612	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	716	WHCRWA 2020 SHARED TRANSMISSION (W/ NFBWA)	$ -	2010	8/3/10 11:26 AM
1603	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	715	WHCRWA INTERNAL DISTRIBUTION	$ 31,820,000.00	2012	8/3/10 11:26 AM
1604	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	715	WHCRWA INTERNAL DISTRIBUTION	$ 304,732,726.00	2013	8/3/10 11:26 AM
1605	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	715	WHCRWA INTERNAL DISTRIBUTION	$ -	2010	8/3/10 11:26 AM
1606	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	715	WHCRWA INTERNAL DISTRIBUTION	$ -	2010	8/3/10 11:26 AM
1607	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	715	WHCRWA INTERNAL DISTRIBUTION	$ -	2010	8/3/10 11:26 AM
1618	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	PLANNING, DESIGN, AND PERMITTING	904	WHCRWA TO WUG	$ -	2010	8/3/10 11:26 AM
1619	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	ACQUISITION AND CONSTRUCTION	904	WHCRWA TO WUG	$ 89,507,274.00	2010	8/3/10 11:26 AM
1620	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	EXCESS CAPACITY	904	WHCRWA TO WUG	$ -	2010	8/3/10 11:26 AM
1621	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	RURAL	904	WHCRWA TO WUG	$ -	2010	8/3/10 11:26 AM
1622	158	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	BOTH	H	HARRIS	SAN JACINTO	DISADVANTAGED	904	WHCRWA TO WUG	$ -	2010	8/3/10 11:26 AM

Appendix 9B

Survey Questionnaires

This Page Intentionally
Left Blank

KBR

4100 Clinton Drive, Houston, Texas 77020-6237 • P.O. Box 3, Houston, Texas 77001-0003

May 17, 2010

City of Example WUG
216 West WUG
WUG, TX 12345

Subject: Water Infrastructure Financing Survey Report

Dear City of Example WUG:

The Region H Water Planning Group (RHWPG) is currently updating the Regional Water Plan. Your political subdivision is projected to have water demands that exceed the currently available water supply during the 50-year planning period, due to projected population and demand growth, limitations on supplies, or a combination of the two.

The RHWPG is recommending water management strategies to meet the projected water demands. These recommendations are included in the attached Infrastructure Financing Survey Report. If the demand and supply scenarios used in the Regional Water Plan are realized, it is anticipated that the described projects will need to be implemented by the political subdivision.

The Texas Water Code requires the Regional Water Planning Groups to survey all political subdivisions with projected water needs about infrastructure financing. The goal is to determine funding levels for existing infrastructure loan and grant programs. More information on these financial assistance programs (i.e., the Water Infrastructure Fund, the State Participation Fund, and the Economically Disadvantaged Areas Program) can be found at the TWDB website at:

http://www.twdb.state.tx.us/assistance/financial/financial_main.asp

You may complete the survey by following the link below and entering the amounts that you wish to pursue from TWDB programs along with the earliest date you wish to receive these amounts. The attached Infrastructure Financing Survey Report identifies the water supply projects recommended for the City of Alvin and includes additional information regarding TWDB financial assistance programs and completion of the survey.

http://www.twdb.state.tx.us/apps/ifr/ifrsurvey.aspx?entityid= ABC

If you have any questions regarding this survey, please do not hesitate to call,

Karim El-Kheiashy

Karim El Kheiashy, PhD P.E.
Principal Technical Professional/Project Manager
Phone: 713-753-3631
E-mail address: Karim.ElKheiashy@kbr.com

This Page Intentionally
Left Blank

Infrastructure Financing Survey Report

ABC: Example WUG

As part of the regional and state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The purpose of this survey is gather information from your organization regarding how you plan to finance water supply projects recommended for the 2012 state water plan, and determine whether you intend to use financial assistance programs offered by the State of Texas and administered by the Texas Water Development Board (TWDB).

The TWDB has several funding programs for water projects identified in the 2012 state water plan. Funds are targeted toward: 1) construction of water supply projects, 2) planning and design and permitting for projects that have long development time frames meaning that construction would require 5-10 years of planning, design and permitting, and 3) projects that would be built with excess capacity intended to meet future water needs. These programs offer various attractive financing options such as subsidized interest rates, deferral of principal and interest during planning, design and permitting phase, partial deferral of interest and principal for those portions of the project which are optimally sized for future needs. Additionally, grant funding is available for those service areas which qualify as rural or economically disadvantaged. More information on these financial assistance programs (i.e., the Water Infrastructure Fund, the State Participation Fund, and the Economically Disadvantaged Areas Program) can be found at the TWDB website at:

http://www.twdb.state.tx.us/assistance/financial/financial_main.asp

Your cooperation and responses to these questions are crucial in helping the state in ensuring that our communities and our citizens have adequate water supplies. If you have any questions related to the financial programs offered by the TWDB or about the survey questions, please contact Jason Afinowicz by phone at (713)267-3122 or by email at jason.afinowicz@aecom.com. If you have any computer or technology related problems with the survey, please contact Wendy Barron by phone at (512) 936-0886 or by email at wendy.barron@twdb.state.tx.us.

Section 1: Project Financing Information

For project(s) identified in the State Water Plan, the TWDB has funding available for different aspects of a project. The different programs available are:

•WIF-Deferred offers subsidized interest and deferral of principal and interest for up to 10 years for planning, design and permitting costs.

•WIF-Construction offers subsidized interest for all construction costs, including planning, acquisition, design, and construction.

•State Participation funding offers partial interest and principal deferral for the incremental cost of project elements which are designed and built to serve needs beyond 10 years.

•Rural areas funding offers grants and 0% interest loans for service areas which are not in a Metropolitan Statistical Area (MSA) and in which the population does not exceed 5,000. The service area must also meet the EDAP eligibility criteria.

•Economically Distressed Areas Program (EDAP) offers funding through grants and loans for service areas within a project which meet the EDAP eligibility criteria. Eligibility for the TWDB's EDAP requires that the median household income of the area to be served by the proposed project be less than 75 percent of the Texas median household income ($39,927), as shown in the 2000 Census. EDAP eligibility also requires adoption of Model Subdivision rules by the appropriate planning entities.

Infrastructure Financing Survey Report

•State Participation funding offers partial interest and principal deferral for the incremental cost of project elements which are designed and built to serve needs beyond 10 years.

If you are interested in receiving funds from the above programs, please complete the remainder of the survey.

Please enter only the amounts you wish to receive from TWDB program in the Project Costs fields and do not enter a specific project cost more than once.

Section 2: Projects

For each of the project(s) listed below, please enter only the amounts you wish to receive from TWDB programs in the 'Cost' field and the earliest date you wish to receive these amounts. In addition, the total amount entered into all five categories cannot exceed the total cost of the project. Each of the five categories corresponds to a funding program available at the TWDB. Each of the funding programs and categories are described below.

•Planning, design, permitting: Enter costs into the 'Planning, design, permitting' category if you want to participate in the WIF-Deferred program. The WIF-Deferred program offers subsidized interest and deferral of principal and interest for up to 10 years for planning, design and permitting costs.

•Acquisition and construction: Enter costs into the 'Acquisition and construction' category if you want to participate in the WIF-Construction program. The WIF-Construction program offers subsidized interest for all construction costs, including planning, acquisition, design, and construction.

•Excess Capacity: Enter costs into the 'Excess capacity' category if you want to participate in the State Participation program. State Participating funding offers partial interest and principal deferral for the incremental cost of project elements which are designed and built to serve needs beyond 10 years.

•Rural: Enter costs into the 'Rural' category if you want to participate in the Rural areas funding program. Rural areas funding offers grants and 0% interest loans for service areas which are not in a Metropolitan Statistical Area (MSA) and in which the population does not exceed 5,000. The service area must also meet the EDAP eligibility criteria.

•Disadvantaged: Enter costs into the 'Disadvantaged' category if you want to participate in the Economically Distressed Areas Program (EDAP). EDAP offers funding through grants and loans for service areas within a project which meet the EDAP eligibility criteria. Eligibility for the TWDB's EDAP requires that the median household income of the area to be served by the proposed project be less than 75 percent of the Texas median household income ($39,927), as shown in the 2000 Census. EDAP eligibility also requires adoption of Model Subdivision rules by the appropriate planning entities.

741 - GCWA TO WUG CONTRACT **$6,517,726.00**

Planning, design, permitting	Cost:		Year:	
Acquisition and contruction	Cost:		Year:	
Excess Capacity	Cost:		Year:	

Infrastructure Financing Survey Report

Rural	Cost:	Year:
Disadvantaged	Cost:	Year:
	Total:	

Section 3: Contact Information

1. Name:
2. Phone Number:
3. Email:
4. Comments

This Page Intentionally
Left Blank

KBR

4100 Clinton Drive, Houston, Texas 77020-6237 • P.O. Box 3, Houston, Texas 77001-0003

July 1, 2010

City of Example WUG
216 West WUG
WUG, TX 12345

Subject: Water Infrastructure Financing Survey Reminder

Dear City of Example WUG:

In May 2010 the Region H Water Planning Group (RHWPG) distributed a letter to inform water utilities and providers of the Texas Water Development Board's (TWDB) Infrastructure Financing Survey. So far, the TWDB has received completed surveys from several political subdivisions but has not received yours!

This is a reminder that the deadline for completing the survey is July 16th. Survey information provided after this deadline will not be included in the 2011 Region H Water Plan. You may complete the survey by following the link below and entering the amounts that you wish to pursue from TWDB programs along with the earliest date you wish to receive these amounts. The attached Infrastructure Financing Survey Report identifies the water supply projects recommended for the City of Alvin and includes additional information regarding TWDB financial assistance programs and completion of the survey.

http://www.twdb.state.tx.us/apps/ifr/ifrsurvey.aspx?entityid=ABC

The Texas Water Code requires the Regional Water Planning Groups to survey all political subdivisions with projected water needs regarding infrastructure financing. The goal is to determine funding levels for existing infrastructure loan and grant programs. More information on these financial assistance programs (i.e., the Water Infrastructure Fund, the State Participation Fund, and the Economically Disadvantaged Areas Program) can be found at the TWDB website:

http://www.twdb.state.tx.us/assistance/financial/financial_main.asp

If you have any questions regarding this survey, please do not hesitate to call,

Karim El Kheiashy

Karim El Kheiashy, PhD P.E.
Principal Technical Professional/Project Manager
Phone: 713-753-3631
E-mail address: Karim.ElKheiashy@kbr.com

This Page Intentionally
Left Blank

Contents

List of Tables

Appendices

Chapter 10 – Public Participation in Developing the 2011 Region H Water Plan

10.1 Introduction

The Region H Water Planning Group (RHWPG) has sought to encourage public involvement and the participation of interested parties during the process of plan development so that any concerns could be addressed before the draft plan was completed. From its initial deliberations in preparing the 2001 Regional Water Plan, the RHWPG has made a commitment to an open planning process and has actively solicited public input and involvement in developing the elements of the 2011 Regional Water Plan (RWP). Securing a high level of public participation continues to be a challenge for long-term planning, even for a topic so vital to public well-being as the water supply, particularly if there is no drought. The attention of the news media in a major media market is rarely focused on continuing efforts that result in lengthy documents, no matter how important those documents may be to the region's future. Nevertheless, the RHWPG has reached out to communicate with the general public and especially with those segments of the population who will be most affected by the results of the regional water plan. This has been accomplished by pursuing several avenues to gain public involvement.

10.1.1 Regional Water Planning Group as Stakeholder Representatives

The first line of public involvement occurs through the membership of the Region H Water Planning Group. Each of the members of the RHWPG represent an interest category, such as river authority, agriculture, small businesses, general public, etc. They also represent the different geographic areas within this large region. Most of these members have linkages to the community through various organizations. These linkages, such as professional organizations or citizens groups, are the first avenue for taking information to the public and for receiving input to the RHWPG.

During development of the 2011 RWP, the RHWPG has met on the first Wednesday of the month at least quarterly, but often on a more frequent basis, so that interested parties can plan to attend and follow the proceedings. Notices of these meetings are posted in each of the counties in Region H and are e-mailed to a list of "interested persons" who have requested to be informed. The RHWPG maintains minutes of its meetings and places them on the Region H Water website for review, along with a multitude of other meeting resources.

10.1.2 Public Meetings during Plan Development

In addition to the August 2006 public hearing initiating the first biennium of the planning effort, the Region H Water Planning Group has held public meetings/hearings at several points in the planning process. Meeting formats encouraged discussion of the issues and in spite of the sparse turnout, those attending generally gave positive feedback. Summaries of the meetings and lists of attendees are included in this report.

This initial hearing in August 2006 began the development of special studies on environmental flows, drought management, and interruptible supplies. Another public hearing was held in May 2008 to initiate the second biennium of planning that would culminate in the development of the 2011 RWP. This meeting was held at the office of the San Jacinto River Authority in conjunction with a regular meeting of the RHWPG.

In May and July of 2009, meetings were again held at the San Jacinto River Authority offices. These were both morning meetings and focused on review and comment on the draft population projections prepared by the RHWPG with cooperation from the TWDB for use in preparing the 2011 RWP.

In March and April of 2010, the RHWPG conducted public hearings in Houston, Madisonville, and Conroe to receive public comment on the Initially Prepared Plan. Meetings in Madisonville and Conroe were well attended by the public, particularly with comments regarding the proposed Millican Reservoir project as a water management strategy.

10.1.3 Targeted Meetings during Plan Development

Interaction with and updates to the 40-member Galveston Bay Freshwater Inflow Group (GBFIG) provided a forum for communication with environmental and conservation organizations and commercial and recreational fisher groups, as well as the GBFIG members from business and state and local agencies. GBFIG continues to work on developing management strategies for meeting the freshwater inflow targets that are endorsed in the 2001 and 2006 RWPs.

10.1.4 Public Notices and Press Releases

Media coverage was sought in conjunction with each series of public meetings or hearings. For each series, paid meeting notices were placed in fourteen newspapers providing service to all fifteen of the counties in Region H. Direct first-class mailings to county judges and mayors accompanied the issuance of public notices.

10.1.5 Region H Water Website

A website was developed at the onset of the first biennium of the 2011 RWP in order to maintain a constant level of contact with the public and to provide members of the RHWPG with resources for plan development. The new site, Region H Water (http://regionhwater.org), provides visitors with background on the importance of water and conservation efforts as an overview of the regional planning process in Texas. The site also provides information and announcements for meetings of the RHWPG and downloads of past and in-progress RWPs.

10.1.6 Texas Water Development Board Website

The Region H Water Planning Group has taken advantage of the Internet site provided by TWDB on its home page (www.twdb.state.tx.us). Upcoming meetings, minutes of previous meetings, and contact information are posted. TWDB has posted a copy of the 2001 and 2006 RWPs on its site as well.

10.2 Summary of Public Hearing, August 2, 2006

A public hearing to receive comments on the proposed scope of work for the grant application to update the Region H Water Plan was held on August 2, 2006 at 10 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. Three individuals provided comments.

Mr. Brandt Mannchen of the Houston Sierra Club expressed that the Sierra Club has sixteen potential issues for the next round of planning. The top two consisted of the environmental flow needs and drought management strategies. Mr. Mannchen stated he would like to see a target for industrial water conservation, which is not currently part of the plan. He questioned if the agricultural water conservation goals could be attained, and he said he would like to see stronger municipal conservation plans.

Mr. Ken Kramer of the Lone Star Sierra Club echoed the comments of Mr. Mannchen on the issues on environmental flow needs and drought management strategies. As for the other two issues, he stated he had no objections to them. The municipal conservation plan was updated last year, and he would like to see a survey regarding municipal conservation.

Mr. Jerry Lovelady of the Porter Special Utility District commented on water conservation and stated that there are more opportunities available for more aggressive measures.

Table 10-1: Attendance at Public Hearing, August 2, 2006

2 August, 10:00 a.m., SJRA Offices, Conroe

Interested Public Speaking	**Region H Water Planning Group Members**
Ken Kramer, Sierra Club, Lone Star Chapter	Reed Eichelberger for James Adams, SJRA
Jerry Lovelady, Porter SUD	Roosevelt Alexander, Waller County
Brandt Mannchen, Houston Sierra Club	John Baker, BRA
Consulting Team	John Bartos, Galveston Bay Fdn.
Jason Afinowicz, TCB	John Blount, Harris County
Glenda Callaway, Ekistics	Robert Bruner, Walker County
Lucia Lee, KBR	Mark Evans, Trinity County
David Parkhill, TCB	Jason Fluharty, Texas Genco
	Tom Michel for Mary Alice Gonzalez, Fort Bend County
	Jack Harris, Brazoria County
	Robert Istre, GCWA
	Jace Houston for Marvin Marcell, FBSD
	James Morrison, Walker County Rural Water Supply Corp.
	James Murray, ExxonMobil, Houston
	Ron Neighbors, HGSD, Friendswood
	Jimmie Schindewolf, NHCRWA
	Jeff Taylor, City of Houston

William Teer, Leon County

Steve Tyler, Trinity County

Danny Vance, TRA

Harold Wallace, West Harris County WSC

10.3 Summary of Public Hearing, May 28, 2008

A public hearing to receive comments on the proposed scope of work for the grant application to update the Region H Water Plan was held on May 28, 2008 at 10 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. Six individuals provided comments.

Ken Kramer with the Lone Star Chapter of the Sierra Club commented on the scope of work and complimented the Region H website. He voiced support for the supplemental funding request related to water conservation and encouraged the use of demand management to meet monthly or daily shortages. He also encouraged evaluation of successful water conservation plans in other regions to see how they compare with plans in Region H. He stated that the Sierra Club opposes Bedias Reservoir and that other strategies would be better.

Dan Davis expressed his appreciation for Region H's work. He expressed support for Bedias Reservoir and explained that it would mitigate issues related to the use of Lake Conroe surface water. He discussed the role of water conservation in future planning. He encouraged the legislature to fund research with the objective of determining an acceptable method of using treated effluent for direct injection into potable water treatment plants. Mr. Davis explained that he was a member of the Lake Conroe Communities Network and the Walden Community Improvement Association, and that he was a director on Montgomery County MUD 8, but that he was testifying in his individual capacity.

Jackie Chance commented on the environmental flows into Galveston Bay and the reduction of same when the groundwater conversion takes place and emphasized the need to study potential impacts. He encouraged the construction of more reservoirs and requested that TCEQ request drought contingency plans and water conservation plans from smaller systems also.

Jerry Fannin requested that Madison County have a representative on Region H. He expressed his concern regarding consideration of Bedias Reservoir as a potential management strategy.

Gerald Jozwiak, a Madison County resident, stated that he opposed the construction of Bedias Reservoir and wants it removed from Region H Plan completely. He commented on the wetlands, hardwood forests, wildlife, and the negative economic impacts on agriculture that this reservoir would have on their community. He echoed previous comments on the need to reduce the demand for water through conservation. He stated that additional reservoirs would not be needed if Montgomery County residents reduced their demand through conservation.

Art Henson, County Judge for Madison County, expressed opposition to Bedias Reservoir and requested that the impacts on agriculture and the local tax base be considered in planning for surface water. He requested a seat on the Region H Planning Group and stated that a formal request would be forthcoming.

Mike Reedy summarized written comments received from Ronald Rushing, Senator Robert Nichols, Representative Brandon Creighton, Angela Fannin, and Dan Davis.

Table 10-2: Attendance at Public Hearing, May 28, 2008

28 May, 10:00 a.m., SJRA Offices, Conroe

Interested Public	**Region H Water Planning Group Members**
Jackie Chance, So. Montgomery County Area	Roosevelt Alexander, Waller County
Jerry Fannin, Madison County	John Baker, BRA
Dan Davis, Lake Conroe Area	John Bartos, Galveston Bay Fdn.
Art Henson, Madison County	John Blount, Harris County
Gerald Jozwiak, Madison County	Robert Bruner, Walker County
Ken Kramer, Sierra Club, Lone Star Chapter	Reed Eichelberger, SJRA
	Mark Evans, Trinity County
Consulting Team	Jason Fluharty, Texas Genco
Jason Afinowicz, TCB	Jack Harris, Brazoria County
Glenda Callaway, Ekistics	Bob Hebert, Fort Bend County
Chris Krueger, KBR	Robert Istre, GCWA
Mike Reedy, TCB	Ron Neighbors, HGSD
	Jimmie Schindewolf, NHCRWA
	Jeff Taylor, City of Houston
	William Teer, Leon County
	Steve Tyler, Trinity County
	Mike Uhl, DOW
	Danny Vance, TRA
	Harold Wallace, West Harris County WSC
	Pudge Wilcox, CLCND

10.4 Summary of Public Meeting, May 6, 2009

A public meeting to approve population and water demand projections was held on May 6, 2009 at 10 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comment on the proposed projections.

Mike Reedy with AECOM reviewed the current schedule for preparing the 2011 Regional Water Plan. He then turned the presentation over to Jason Afinowicz with AECOM to present the results of the population and water demand projection analysis (Task 2), including the steam-electric demands, population projections, and municipal water demands.

Brandt Mannchen commented on the proposed population and water demand projections that will be used in preparing the revised Region H Water Plan. He distributed a written summary of his comments and then briefly summarized his thoughts on the availability and clarity of the information, the public comment period, and the process in general. Mr. Mannchen encouraged the group to withdraw the submittal of revised population and water demand projections until the public policy issues of population growth and economic growth can be debated. Harold Wallace inquired as to what evidence was available to reflect that the information that the consultant provided was inaccurate, and Mr. Mannchen responded that more time was needed to evaluate the available information.

Discussion ensued regarding questions and concerns related to the population projections for the City of Richmond, the City of Huntsville, and the information related to the demand projections for steam electric power. Ron Neighbors asked about the process for partially approving the population and water demand projections and approving the modifications in the future. Temple McKinnon stated that modifications would require the same process for approval if excluded. Ted Long commented on the steam electric power numbers for Fort Bend County and Galveston County; he will review historical records and get back with Mike Reedy with his findings.

Robert Istre inquired as to the source of the information presented, and Temple McKinnon responded that the regional and county totals are based on the State Data Center's information. John Bartos encouraged the consultants to comment on Mr. Mannchen's questions and concerns, and Mike Reedy confirmed that this would be done. Steve Tyler inquired as to how the projected population and demand numbers compared to the availability of water. Carol Reed with the City of Huntsville briefly discussed the potential growth of the Huntsville area. She stated that Huntsville has already exceeded the 2010 projected water demand numbers and the per capita use is increasing.

Mike Reedy made the recommendation that approval be given for the submittal of revised population and water demand projections to the TWDB as presented, excluding those for the City of Huntsville, City of Richmond, and the steam electric demands. Motion was made by Roosevelt Alexander to approve the population and water demand projections as presented, excluding those for the City of Huntsville, City of Richmond, and steam electric demands for Fort Bend and Galveston counties; seconded by Robert Bruner. The motion was approved with one nay vote. Steve Tyler voted nay.

Table 10-3: Attendance at Public Hearing, May 6, 2009

<u>6 May, 10:00 a.m., SJRA Offices, Conroe</u>

Interested Public Speaking	Region H Water Planning Group Members
Brandt Mannchen, Houston Sierra Club	Roosevelt Alexander, Waller County
Carol Reed, City of Huntsville	John Bartos, Galveston Bay Fdn.
	John Blount, Harris County
	Robert Bruner, Walker County

Consulting Team

Jason Afinowicz, AECOM

Glenda Callaway, Ekistics

Karim El Kheiashy, KBR

Chris Krueger, KBR

Mike Reedy, AECOM

Jun Chang, City of Houston

Reed Eichelberger, SJRA

John Hofmann, BRA

John Howard, Austin County

Mike O' Connell for Bob Hebert, Fort Bend County

Robert Istre, GCWA

Ted Long, NRG

Tom Michel for Marvin Marcel, FBSD

James Morrison, Walker County Rural Water Supply Corp.

Ron Neighbors, HGSD

Paul Nelson for Jimmie Schindewolf, NHCRWA

William Teer, Leon County

Steve Tyler, Trinity County

Danny Vance, TRA

Harold Wallace, West Harris County WSC

Pudge Wilcox, CLCND

10.5 Summary of Public Meeting, July 1, 2009

A public meeting to approve population and water demand projections was held on July 1, 2009 at 10 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comment on the proposed projections.

Brandt Mannchen commented on the population and water demand projections. Mr. Mannchen distributed a summary of his personal comments related to water planning and management. He urged Region H to reduce water demand through conservation, and he emphasized the need to determine the sustainable population in each watershed and to provide water for that population.

A presentation by Jason Afinowicz covered the revised population and demand projections for the City of Huntsville, the City of Richmond, North Fort Bend Water Authority, and steam-electric demands for Fort Bend County. Mr. Afinowicz discussed the outstanding issues with each and efforts made to address each of them. Discussion ensued regarding the Texas Water Development Board's consistent under-projection of population in Fort Bend County. Discussion was led by Ron

Neighbors, Marvin Marcell, John Hofmann, and David Parkhill on the planning process and the need to be able to address concerns as part of the planning process. A suggestion was made by the group and confirmed by Mark Evans that language needed to be included in the Chapter 2 narrative to clearly state the group's reasons for preferring a higher number for Fort Bend's population and also to state the group's disagreement with the TWDB's required population number. An additional suggestion was made to include alternative management strategies to address the under-projections. Temple McKinnon commented that TWDB is bound to statewide numbers provided by the State Data Center, which does not allow for county increases. She explained TWDB's approach and said that the 2010 Census will provide the next opportunity for significant changes to be made. Mr. Afinowicz continued with his presentation by responding to Brandt Mannchen's previous request for more information related to population and water demand projections.

Brandt Mannchen stated that he was in agreement with Marvin Marcell's comments during the discussion related to population projections. He commented on the need to look back at previous projections and ways to improve in the future.

Motion was made by Ron Neighbors to approve the recommended population and water demand projections with direction to the consultant team to include the language stated as a caveat on the Fort Bend numbers; seconded by Harold Wallace. The motion was approved with two nay votes. Marvin Marcell and Bob Hebert voted nay.

Table 10-4: Attendance at Public Hearing, July 1, 2009

1 July, 10:00 a.m., SJRA Offices, Conroe

Interested Public Speaking	**Region H Water Planning Group Members**
Brandt Mannchen, Houston Sierra Club	John Bartos, Galveston Bay Fdn.
	John Blount, Harris County
	Robert Bruner, Walker County
Consulting Team	Lisa Lattu for Jun Chang, City of Houston
Jason Afinowicz, AECOM	Reed Eichelberger, SJRA
Glenda Callaway, Ekistics	John Hofmann, BRA
Karim El Kheiashy, KBR	Lloyd Behm for John Howard, Austin County
Chris Krueger, KBR	Bob Hebert, Fort Bend County
David Parkhill, AECOM	Robert Istre, GCWA
	Glynna Leiper, Exxon-Mobil
	Ted Long, NRG
	Marvin Marcel, FBSD
	James Morrison, Walker County Rural Water Supply Corp.

Ron Neighbors, HGSD

Jimmie Schindewolf, NHCRWA

William Teer, Leon County

Steve Tyler, Trinity County

Gena Leathers for Mike Uhl, DOW

Danny Vance, TRA

Harold Wallace, West Harris County WSC

Pudge Wilcox, CLCND

10.6 Public Review and Comment on Initially Prepared Plan

10.6.1 Identification of Libraries

During the first phase of planning the RHWPG contacted each of the County Judges in the region and requested their assistance in identifying the public library in each county that would be most appropriate for placing a copy of the initially prepared Draft Regional Water Plan for public review. The libraries selected, together with the County Clerk's office in each county, are listed in *Table 10-5*.

10.6.2 Public Notice and Press Releases

As required by Section 357.12 of the Texas Administrative Code, notice of the upcoming public hearings on the initially prepared Draft Regional Water Plan was provided by several means.

- Notice of the public hearings, written comment period, and location of copies of the Draft Plan for public review were posted in each county in the region.
- Paid ads providing notice of the public hearings, written comment period, and location of copies of the Draft Plan for public review were placed in 16 newspapers serving the region. One of the newspapers, the Bryan-College Station Eagle, is located outside of the Region but is the main newspaper serving the northern portion of Region H. It also serves the area that includes two potential reservoirs as management strategies in the IPP.
- In accordance with 31 TAC section 357.12(5)(A-E), direct notice by first-class mail was made to the following:
  (a) 140 Mayors
  (b) 15 County Judges
  (c) 5 Special districts and river authorities in the region as identified by the Texas Commission on Environmental Quality (TCEQ)
  (d) 1,347 Community water systems as identified by TCEQ
  (e) 353 Water rights holders as identified by TCEQ

Notice of the hearings also was posted on the Regional Planning section of the TWDB website and the Region H Water website.

10.6.3 Distribution of Documents for Review and Comment

A public library and the County Clerk's office in each county in Region H were identified to receive review copies of the draft Plan. The Initially Prepared 2011 Region H Water Plan was placed in the designated public repositories, listed in *Table 10-5*, on February 26, 2010. The document was also made available on the Region H Water and TWDB websites.

Table 10-5: Public Repositories of the Region H Regional Water Plan

AUSTIN COUNTY County Clerk County Courthouse 1 East Main Bellville, TX 77418	**AUSTIN COUNTY** Gordon Library 917 Circle Drive Sealy, TX 77474
BRAZORIA COUNTY County Clerk County Courthouse 111 East Locust Angleton, TX 77515	**BRAZORIA COUNTY** Angleton Public Library 401 East Cedar Angleton, TX 77515
CHAMBERS COUNTY County Clerk County Courthouse Anahuac, TX 77514	**CHAMBERS COUNTY** Chambers County Library – Main Branch 202 Cummings Anahuac, TX 77514
FORT BEND COUNTY County Clerk 301 Jackson Richmond, TX 77469	**FORT BEND COUNTY** George Memorial Library 1001 Golfview Richmond, TX 77469
GALVESTON COUNTY County Clerk County Courthouse 722 Moody Galveston, TX 77550	**GALVESTON COUNTY** Rosenberg Library 2310 Sealy Galveston, TX 77550
HARRIS COUNTY County Clerk Harris County Administration Building 1001 Preston Avenue Houston, TX 77002	**HARRIS COUNTY** Houston Public Library 1st Floor, Bibliographic Information Center 500 McKinney Houston, TX 77002
LEON COUNTY County Clerk Leon County Courthouse Centerville, TX 75833	**LEON COUNTY** Leon County Library 129 East Main Centerville, TX 75833
LIBERTY COUNTY County Clerk County Courthouse 1923 Sam Houston Liberty, TX 77575	**LIBERTY COUNTY** Sam Houston Regional Library And Research Center FM1011 Liberty, TX 77575

MADISON COUNTY
County Clerk
101 West Main, Room 102
Madisonville, TX 77864

MADISON COUNTY
Madison County Library
605 South May
Madisonville, TX 77864

MONTGOMERY COUNTY
County Clerk
County Courthouse
301 N. Thompson
Conroe, TX 77301

MONTGOMERY COUNTY
Montgomery County Central Library
104 Interstate 45 North
Conroe, TX 77301

POLK COUNTY
County Clerk
County Courthouse, 1st Floor
101 West Church
Livingston, TX 77351

POLK COUNTY
Murphy Memorial Library
601 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
County Clerk
County Courthouse
#1 Highway 150
Coldspring, TX 77331

SAN JACINTO COUNTY
Coldspring Library
220 South Bonham
Coldspring, TX 77331

TRINITY COUNTY
County Clerk
County Courthouse
1st and Main
Groveton, TX 75845

TRINITY COUNTY
Blanche K. Werner Library
Highway 19
Trinity, TX 75862

WALKER COUNTY
County Clerk
County Courthouse
1100 University Avenue
Huntsville, TX 77340

WALKER COUNTY
Huntsville Public Library
1216 – 14th Street
Huntsville, TX 77340

WALLER COUNTY
County Clerk
County Courthouse
836 Austin Street
Hempstead, TX 77445

WALLER COUNTY
Waller County Library -
Brookshire/Pattison
3815 Sixth Street
Brookshire, TX 77423

10.7 Summary of Public Hearings and Written Comments on the Initially Prepared Plan

The Region H WPG chose to hold public hearings on its Initially Prepared Region H Water Plan at three locations in the region. The first was held at 6:30 p.m. at the Houston- Galveston Area Council (H-GAC) which is centrally located in the region and accessible to the largest part of the region's population. The second was at 6:30 p.m. in Madisonville in the northern portion of the region. Finally, the third hearing was held at 10 a.m. in conjunction with a scheduled RHWPG meeting in Conroe.

Proceedings at each of the public hearings followed a similar format.

- Welcome and Introductions: John Bartos, RHWPG Member, welcomed attendees and made introductions at the March 30 hearing; Mark Evans, RHWPG Chair, welcomed attendees and made introductions at the April 1 and 7 hearings..
- A brief presentation of the draft Plan was made by the consulting team. (Copies of presentation slides are included as Appendix C.)
- Formal comments or questions were given by attendees who registered to speak.
- Information on the written comment period and process for adopting the Plan was provided.
- Informal dialogue, including discussion of responses that were known at the time,followed.

Handouts for each meeting consisted of a copy of the Executive Summary to the Initially Prepared Region H Water Plan, and a copy of the presentation slides.

A certified court reporter prepared a formal record of proceedings at each hearing site. Summaries of formal comments are based on these proceedings. Attendance at the Public Hearings is shown in Table 10-5.

It was announced in the public notice and at each public hearing site that written comments on the initially prepared Draft Regional Water Plan would be accepted through June 8, 2010 for inclusion in the published plan.

Written comments and responses to them are included in *Appendix H*.

10.7.1 Summary of Public Hearing, March 30, 2010

The March 30 public hearing was held at H-GAC and received a small attendance. A presentation on the IPP, similar to the other public hearings on the plan, was given to the audience. Public comments were received from Brandt Mannchen of the Houston Sierra Club, followed by unofficial comments and questions.

Table 10-6: Attendance at Public Hearing, March 30, 2010

30 March, 6:30 p.m., H-GAC Offices, Houston

Interested Public Speaking	**Region H Water Planning Group Members**
Brandt Mannchen, Houston Sierra Club	John Bartos, Galveston Bay Fdn
	Mark Evans, Trinity County
Consulting Team	Lisa Lattu for Jun Chang, City of Houston
Jason Afinowicz, AECOM	Gena Leathers, DOW
Glenda Callaway, Ekistics	Paul Nelson for Jimmie Schindewolf, NHCRWA
Karim El Kheiashy, KBR	Pudge Wilcox, CLCND
Chris Krueger, KBR	
John Seifert, LBG-Guyton	
Cory Stull, AECOM	
Philip Taucer, AECOM	

10.7.2 Summary of Public Hearing, April 1, 2010

The April 1 public hearing was held at the Truman Kimbro Convention Center in Madisonville and was heavily attended attendance. A presentation on the IPP, similar to the other public hearings on the plan, was given to the audience. Public comments were received from numerous members of the public, followed by unofficial comments and questions.

Table 10-7: Attendance at Public Hearing, April 1, 2010

1 April, 6:30 p.m., Truman Kimbro Convention Center, Madisonville

Interested Public Speaking	**Region H Water Planning Group Members**
Robert Averyt	Mark Evans, Trinity County
Daiquin Beebe	Art Henson, Madison County
Brenda Bender	William Teer, Leon County
Cathy Cox	Steve Tyler, Trinity County
Leonard Cox	
Fred Davis	**Consulting Team**
Mark Dudley	Jason Afinowicz, AECOM
Gerald Jozwiak	Glenda Callaway, Ekistics
Bill Knotts	Karim El Kheiashy, KBR
John Knotts	Eric Hall, KBR
John Melvin	Chris Krueger, KBR
	John Seifert, LBG-Guyton
	Nichola Smiles, KBR
	Cory Stull, AECOM
	Philip Taucer, AECOM

10.7.3 Summary of Public Hearing, April 7, 2010

The April 7 public hearing was held at the Lone Star Convention and Expo Center in Conroe and received a fairly large crowd. A presentation on the IPP, similar to the other public hearings on the plan, was given to the audience. Public comments were received from numerous members of the public, followed by unofficial comments and questions.

Table 10-8: Attendance at Public Hearing, April 7, 2010

7 April, 6:30 p.m., Lone Star Convention and Expo Center, Conroe

Interested Public Speaking	Region H Water Planning Group Members
Robert Averyt	John Bartos, Galveston Bay Fdn
Brad Ayers	Jun Chang, City of Houston
Paul Bannon	Mark Evans, Trinity County
Mike Brinkmann	Art Henson, Madison County
Sammy Catalena	Gena Leathers, DOW
Kathy Cox	Ted Long, NRG
Leonard Cox	Danny Vance, TRA
Mark Dudley	Pudge Wilcox, CLCND
Luke Grahm	
Tom Ivy	**Consulting Team**
Gerald Jozwiak	Jason Afinowicz, AECOM
Laura Klemm	Glenda Callaway, Ekistics
Bill Knotts	Karim El Kheiashy, KBR
John Knotts	Chris Krueger, KBR
Ken Kramer	David Parkhill, AECOM
T. Barrett Lyne	Cory Stull, AECOM
Richard Tauber	Philip Taucer, AECOM
Jerry Wall	
Jim Wall	
Kay Wilson	

Appendix 10A

Public Hearing Materials
August 2, 2006

This Page Intentionally
Left Blank

Contents – August 2, 2006 Public Hearing

MINUTES
REGION H WATER PLANNING GROUP MEETING
10:00 A.M.
AUGUST 2, 2006
SAN JACINTO RIVER AUTHORITY OFFICE
LAKE CONROE DAM
1577 DAM SITE ROAD
CONROE, TEXAS

MEMBERS PRESENT: Roosevelt Alexander, John Baker, John R. Bartos, John Blount, Robert Bruner, Mark Evans, Jason Fluharty, Jack Harris, Robert Istre, James Morrison, James Murray, Ron Neighbors, Jimmie Schindewolf, Jeff Taylor, William Teer, Steve Tyler, Danny Vance, and C. Harold Wallace .

DESIGNATED ALTERNATES: Reed Eichelberger alternate for James Adams, Jace Houston alternate for Marvin Marcell, and Tom Michel alternate for Mary Alice Gonzalez.

MEMBERS ABSENT: James Adams, Mary Alice Gonzalez, David Jenkins, and Marvin Marcell.

NON-VOTING MEMBERS PRESENT: Wayne Ahrens, Bill Roberts, and Woody Woodrow

PRESIDING: Mark Evans, Vice Chairman

INTRODUCTIONS

Mr. Evans stated that Reed Eichelberger is the alternate for James Adams, Jace Houston is the alternate for Marvin Marcell, and Tom Michel is the alternate for Mary Alice Gonzalez.

COMMENTS ON JIM ADAMS PASSING

A number of comments and recognitions were made concerning the passing of Jim Adams, and a moment of silence was observed.

MINUTES OF MAY 3, 2006 MEETING

A motion was made by Mr. Vance to approve the minutes of the May 3, 2006, meeting as presented; second by Mr. Blount. The motion carried unanimously**.**

PUBLIC COMMENTS ON AGENDA ITEMS 4 - 9

None.

ELECTION OF MIKE UHL TO REPLACE CAROLYN JOHNSON ON REGION H

A motion was made by Mr. Harris to select Mr. Mike Uhl as a voting member of the Region H RWPG representing industries; second by Mr. Blount. Motion carried unanimously.

DISCUSS STATUS OF OPEN CHAIRMANSHIP OF THE REGION H RWPG

Mr. Evans reported that the Executive Committee had a conference call to discuss how to move forward in the wake of Mr. Adams death. A letter was sent to the SJRA concerning the continued use of their meeting facilities and their willingness to continue acting as the contracting administrative agency on behalf of Region H at least through the transition period. The committee discussed possible replacements for Mr. Adams as chairman of the Region H RWPG. A discussion ensued.

ELECTION OF CHAIRMAN OF THE REGION H RWPG

A motion was made by Mr. Neighbors nominating Jeff Taylor to serve as chairman of the Region H RWPG; second by Mr. Alexander. Motion carried unanimously.

NOW PRESIDING: Jeff Taylor, Chairman.

DISCUSS AND TAKE ACTION ON APPROVING TCB/KBR TEAM FOR NEXT ROUND OF PLANNING

Mr. Taylor discussed the need to select a consultant team for the next round of regional planning. A motion was made by Mr. Neighbors to approve the TCB/KBR team to serve as the consultants for the next round of planning; seconded by Mr. Blount. Motion carried unanimously.

UPDATE ON TWDB GRANT PROCESS AND SCHEDULE

David Parkhill presented information concerning the process and schedule for grants from the TWDB for the next round of planning. The deadline for submitting grant applications is September 14, 2006.

Eligible activities for the TWDB planning grants include:

- Evaluation of new water management strategies in response to changed conditions.
- Studies that will further implementation of recommend water management strategies.
- Refinement of water supply information or water management strategies.
- Activities that will help overcome problems from the last round of planning.
- Further evaluation of water management strategies, especially regional solutions, to meet needs in small and rural areas.
- Reevaluation of population and demand projections only under the presence of changed conditions.
- Interregional coordination.
- Administrative and public participation activities.

UPDATE ON SCOPING COMMITTEE ACTIVITIES AND RECOMMENDED SCOPE OF WORK FOR THE NEXT ROUND OF PLANNING

Mr. Parkhill stated that a Scoping Committee had been established to review the TWDB's request for proposals and prepare a draft response. A meeting was held on July 11th, and a subsequent meeting on July 24th. The committee established a preliminary list of scope items and recommended them in the following priority order:

- **Environmental Flows**
  - Further evaluate environmental flow requirements in Region H.
  - Develop improved planning tools to assess impact of water management strategies on environmental flows.
  - Support and participate in state initiatives related to environmental flows policies.
- **Drought Management**
  - Evaluate existing drought management plans currently on file in Region H.
  - Assess the potential impacts to water demands as a result of drought management.
  - Evaluate drought management measures used in other areas and assess the feasibility and applicability of these measures for Region H.
  - Estimate the relative costs resulting from initiating drought management plans in the region.
  - Evaluate the impacts of drought management on the size and timing of water management strategies in Region H.
- **Brazos Saltwater Barrier**
  - Evaluate environmental impacts on the Brazos River estuary.
  - Evaluate mitigation of localized flood impacts from the barrier.
  - Perform additional bathymetric surveys to determine optimal location.
  - Develop conceptual design.
  - Identify project funding and sponsorship opportunities with area project beneficiaries.
- **Interruptible Water Supplies**
  - Establish the magnitude and use of interruptible supplies in the region.
  - Assess the regulatory and institutional issues and constraints associated with this strategy.
  - Establish the magnitude of firm yield supply made available for municipal and industrial purposes as a result of this strategy.
  - Evaluate and quantify the economic impacts of this strategy.

PUBLIC HEARING ON PROPOSED SCOPE FOR NEXT ROUND OF PLANNING

Mr. Taylor called to order the public hearing to receive comments on the proposed of scope of work and planning grant application for the next planning cycle.
Brandt Mannchen of the Houston Sierra Club expressed that the Sierra Club has sixteen potential issues for the next round of planning. The top two consisted of the environmental flow needs and drought management strategies. Mr. Mannchen stated he would like to see a target for industrial water conservation, which is not currently part of the plan. He questioned if the

agricultural water conservation goals could be attained, and he said he would like to see stronger municipal conservation plans.

Ken Kramer of the Lone Star Sierra Club echoed the comments of Mr. Mannchen on the issues on environmental flow needs and drought management strategies. As for the other two issues, he stated he had no objections to them. The municipal conservation plan was updated last year, and he would like to see a survey regarding municipal conservation.

Jerry Lovelady of the Porter Special Utility District commented on water conservation and stated that there are more opportunities available for more aggressive measures.

There being no further comments, Mr. Taylor closed the public hearing at 11:29 AM.

DISCUSS AND TAKE ACTION ON RECOMMENDED SCOPE OF WORK

A discussion ensued regarding the proposed scope of work and planning grant application.

A motion was made by Mr. Vance to approve the recommended scope of work for the next round of planning; second by Mr. Bartos. Motion carried unanimously.

GRANT APPLICATION SUBMISSION

A motion was made by Mr. Wallace to allow the Scoping Committee to review and approve the final draft of the grant application for submission by September 14th; second by Mr. Vance. Motion carried unanimously.

PUBLIC COMMENTS

None.

AGENCY COMMUNICATIONS

Bill Roberts reported that he will continue to work with Region H until a replacement has been hired due to his change of duties at the TWDB.

Woody Woodrow of the Texas Parks & Wildlife Department expressed that he supports the recommendations of the Scoping Committee and that the TPWD will assist in the application as needed.

NEXT MEETING

November 1, 2006
San Jacinto River Authority
Lake Conroe Dam
1577 Dam Site Road

Conroe, Texas

ADJOURNED

Appendix 10B

Public Hearing Materials
May 28, 2008

This Page Intentionally
Left Blank

Contents – May 28, 2008 Public Hearing

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-1111 Facsimile 936-588-3043

Notice of Public Hearing on Proposed Scope of Work and Notice of Application to the Texas Water Development Board for Financial Assistance to Update the Region H Regional Water Plan

April 1, 2008

The 15-county Region H Water Planning Group (RHWPG) is preparing an updated Regional Water Plan which will be submitted to the Texas Water Development Board (TWDB) in 2011. The TWDB will consolidate the reports from the 16 Regional Water Planning Areas and report to the Texas Legislature not later than January 2012.

To meet currently changed conditions, the RHWPG is preparing a Scope of Work to address items to include in the updated Regional Water Plan. The RHWPG is soliciting input from the public about the topics that should be addressed in the work.

A meeting to receive comments from the public on items that may be included in the proposed Scope of Work will be held at 10:00 a.m., May 7, 2004, preceding the regular RHWPG meeting at the SJRA offices, 105 Damsite Road, Conroe, Texas. Action on the Scope of Work may be taken at that meeting. Comments may also be submitted by mail to the SJRA at the address below, or by fax to 936-588-3043 within 30 days of the date of this notice.

Notice is also being given that the RHWPG is submitting an application for a grant from the Texas Water Development Board (TWDB) for planning activities to address these changed conditions. The TWDB will consider the proposed grant application at an upcoming meeting. Region H has designated the San Jacinto River Authority (SJRA) to submit the application to the TWDB. Copies of the application may be requested from SJRA at the address below. **Any comments on the application must be filed with the Executive Administrator of the TWDB (see the address below) and the SJRA within 30 days of this notice.**

The current Region H Water Plan is available for review on the TWDB website at www.twdb.state.tx.us. A draft of known proposed items for the Scope of Work will be available on the RHWPG website at www.regionhwater.org about a week before the public meeting.

When completed, copies of the proposed Scope of Work and the Grant Application will be available for review at the offices of SJRA during regular business hours.

Reed Eichelberger, PE
General Manager
San Jacinto River Authority
P.O. Box 329
Conroe, Texas 77305-0329

J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Region H
Water Planning Group

2011 Planning Round
Second Biennium
Scope of Work

Region H Water Plan

May 28, 2008

Region H
Water Planning Group

Introduction

- Base Funding - $565,270
  - – Determined by TWDB
- Supplemental Funding - $665,530
  - – Proposed by Planning Group
- Total Budget - $1,230,800

2

Region H
Water Planning Group

Base Funding

Base Funding Specified by Task

	Task	TWDB Budget
1	Planning Area Description	$10,000
2	Population and Water Demands	
3	Water Supply Analysis	
4	Identification, evaluation and selection of water management strategies based on needs	$197,470
5	Impacts of selected water management strategies on key parameters of water quality and impacts of moving water from rural and agricultural areas	
6	Water conservation and drought management recommendations	$10,000
7	Description of how the regional water plan is consistent with long-term protection of the state's water resources and natural resources	$10,000
8	Unique stream segments/reservoir sites/legislative recommendations	$15,000
9	Report to Legislature on Water Infrastructure Funding Recommendations	$58,000
10	Adoption of plan	$264,800
	TOTAL	$565,270

3

Region H
Water Planning Group

Supplemental Funding
Critical Issues

Major Issues Addressed with Supplemental Funds

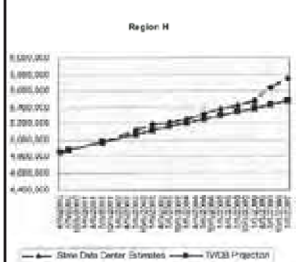
- Mid-census population projections
- Alternative yield of surface water supplies
- Updates to existing water management strategies and alternative water management strategies
- Expanded information to incorporate details of new raw and treated water facilities

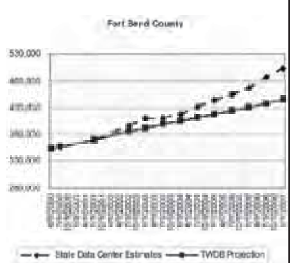
4

Region H
Water Planning Group

Supplemental Funding
Critical Issues

Mid-Census Population Projections





5

Region H
Water Planning Group

Supplemental Funding
Critical Issues

Alternative Supply Analysis for Surface Water Supplies

- Surface water supplies in the plan are determined based on annual firm yield or firm diversions
- Certain major water rights in Region H are significantly less reliable when examined on a monthly basis
- Decreases ability to utilize a water supply for its intended purpose as specified in the 2006 RWP
- Some surface water supplies will need to be evaluated based on a monthly time step to assess alternative supply estimates

6

Region H
Water Planning Group

Supplemental Funding
Critical Issues

Updates to Existing WMS and Alternatives WMS

- Many of the current WMS presented in the 2006 RWP have on-going permitting, environmental, and stakeholder issues
- Issues could either jeopardize the implementation of the strategy and/or reduce the amount of water developed
- Lots of moving parts in Region H (Montgomery County and Fort Bend County groundwater conversion, etc.)
- Alternative strategies are recommended as a mechanism to provide a back-up to this uncertainty
- Many existing WMA also are/will be undergoing changes that will need to be reflected in the plan

7

Region H
Water Planning Group

Supplemental Funding
Critical Issues

Expanded Information for New Raw and Treated Water Facilities

- Region H is often asked to provide opinion and information related to potential infrastructure projects
- Better facilitate the ability to obtain funding from TWDB for major facilities expected to be implemented in next 10 years
- Incorporate additional detail in the plan for major transmission and treatment facilities for:
  - NHCRWA
  - WHCRWA
  - CHCRWA
  - NFBWA
  - City of Houston
  - GCWA

8

Region H
Water Planning Group

Supplemental Funding
Important Issues

Other Important Issues Addressed with Supplemental Funding

- Detailed environmental flow analysis
  - Current Environmental Flows Study only assesses 2060 conditions and does not evaluate the changes and impacts over time
  - Build upon the environmental flows work conducted during first phase of planning
  - Examine each planning decade to investigate Galveston Bay inflows at all stages of planning
- Advanced water conservation analysis
  - Water conservation legislation has been passed since development of the 2006 RWP
  - Incorporate observed conservation data
  - Detailed investigation of conservation impacts

9

Region H
Water Planning Group

Task 0
Base Funding

Task 0 – Scope of Work Development

- Coordination and planning meetings with Region H Scoping Committee
- Develop draft scope of work and cost estimate for second phase of planning
- Coordinate with TWDB on scope items and allowable tasks
- Base Funding = $10,000 (allocated from Task 10)

10

Region H
Water Planning Group

Task 1
Base Funding

Task 1 – Description of Region

- General information about the Region
- Descriptions of new WUG's
- List of threatened and endangered species
- Drought preparations
- Recommendations from 2006 RWP
- Base Funding = $10,000

11

Region H
Water Planning Group

Task 2
Base Funding

Task 2 – Population Projections and Water Demands

- Correspondence to all WUGs regarding demand projections
- Addition of new WUGs
  - TWDB: 3 new cities and 37 new districts = 40 new WUGs
  - NFBWA
  - CHCRWA
- Steam-electric power demands
- Base Funding = $40,000

12

Region H
Water Planning Group

Task 2
Supplemental Funding

Task 2 – Population Projections and Water Demands

- Mid-Census Population Projections
  - Review 2007 city and county population estimates and compare to 2006 RWP
  - Develop projections for 2010
  - Extend projections out to 2060
  - Develop revised population for each WUG (currently over 400)
  - Use 2006 RWP per capita demand to estimate total demand for each WUG
- Supplemental Funding = $98,200

13

Region H
Water Planning Group

Task 3
Base Funding

Task 3 – Water Supply Analysis

- Update groundwater availability
  - Revisions to Gulf Coast GAM
  - GMA 14 Desired Future Conditions
  - New requirements or new GCD's
- Water right/contract revisions
- Update firm yield surface water supply information
- Base Funding = $52,000

14

Region H
Water Planning Group

Task 3
Supplemental Funding

Task 3 – Water Supply Analysis

- Alternative Supply Analysis
  - Evaluate water rights on monthly basis
  - Incorporate expected return flows for Trinity supplies
  - Consult with WWPs on results of study
  - Assign revised water supplies to WUGs and update shortages
- Supplemental Funding = $140,600

15

Region H
Water Planning Group

Task 4
Base Funding

Task 4 – Water Management Strategies

- Update WMS Costs to 2nd Quarter 2007
- Select new strategies for identified shortages
- Incorporate results from Environmental Flows Study performed during first phase of planning
- Incorporate results from Interruptible Supply study performed during first phase of planning
- Base Funding = $73,470

16

Region H
Water Planning Group

Task 4
Supplemental Funding

Task 4 – Water Management Strategies

- Changed Conditions for Strategies
- Environmental Flows Investigation
- Environmental Flows Coordination
- Alternative Strategy Formulation
- Total Task 4 Supplemental Funding = $363,600

17

Region H
Water Planning Group

Task 4
Supplemental Funding

Task 4 – Water Management Strategies

- Changed Conditions for Strategies
  - Update BRA System Operation strategy and determine impacts to future water supplies in Region H
  - Update Montgomery County surface water conversion strategy and incorporate into Plan
  - Re-definition of Luce Bayou strategy based on revised needs and updated project details
  - Identify major transmission and treatment facilities to be included in order to facilitate TWDB funding
- Supplemental Funding = $121,200

18

Region H Water Planning Group

Task 4 Supplemental Funding

Task 4 – Water Management Strategies

- Environmental Flows Investigation
  - Create models for 2010, 2020, 2030, 2040, 2050, and 2060 conditions
  - Review RWPs for Regions C and G to determine future conditions based on WMS implementation
  - Evaluate impacts to Galveston Bay estuary in each decade
  - Compile information on impacts associated with each Region H strategy
- Supplemental Funding = $111,700

19

Region H Water Planning Group

Task 4 Supplemental Funding

Task 4 – Water Management Strategies

- Environmental Flows Coordination
  - Galveston Bay Freshwater Inflow Group
    - Sponsor meetings
    - Present technical information from Region H study
  - Environmental Flows Allocation Process
    - Bay and Basin Stakeholder Groups
    - Present technical information from Region H study
  - Updates to Region H WPG on activities of environmental flow stakeholder groups
- Supplemental Funding = $45,000

20

Region H Water Planning Group

Task 4 Supplemental Funding

Task 4 – Water Management Strategies

- Alternative Strategy Formulation
  - Update strategies not selected in 2006 RWP
  - Potential new strategies
    - New storage to firm up run-of-river supplies
    - Aquifer Storage and Recovery (ASR)
    - Brackish water desalination
  - Develop costs and impact matrix in order to make recommendations for alternative strategy selection
- Supplemental Funding = $75,700

21

Region H Water Planning Group

Task 5 Base Funding

Task 5 – Water Management Strategy Impacts

- Update management strategy impacts with information gained since the 2006 RWP
  - Water quality impacts
  - Impacts of moving water from rural and agricultural areas
- Base Funding = $32,000

22

Region H Water Planning Group

Task 6 Base Funding

Task 6 – Water Conservation and Drought Management

- Survey each WUG regarding conservation strategies and available information on impacts of water conservation
- Compare results to proposed conservation in 2006 RWP
- Incorporate results of Drought Management Study performed during first phase of planning
- Base Funding = $10,000

23

Region H Water Planning Group

Task 6 Supplemental Funding

Task 6 – Water Conservation and Drought Management

- Water Conservation Evaluation
  - Review submitted water conservation plans submitted to TCEQ and TWDB
  - Review expected efficacy of submitted water conservation plans
  - Request information pertaining to observed conservation efficacy
  - Adjust conservation strategies accordingly
- Supplemental Funding = $63,500

24

Region H
Water Planning Group

Task 7
Base Funding

Task 7 – Plan Consistency with Long-term Protection of State's Natural Resources

- Update descriptions of water management strategies and alternative strategies identified this round
- Base Funding = $10,000

25

Region H
Water Planning Group

Task 8
Base Funding

Task 8 – Unique Stream Segments / Reservoir Sites / Legislative Recommendations

- Review designations and recommendations from 2006 RWP
- Provide descriptions of any new reservoir projects
- Identify changes in stream segment classifications
- Review legislative recommendations from 2006 RWP to determine need to add and/or remove
- Base Funding = $15,000

26

Region H
Water Planning Group

Task 9
Base Funding

Task 9 – Water Infrastructure Funding

- Contact individual WUGs regarding possible funding requests
- Tabulate needs as reported by individual WUGs including project costs
- Incorporate information into Plan
- Provide summary in Plan pointing to the location of potential funding needs in the 2011 RWP
- Base Funding = $58,000

27

Region H
Water Planning Group

Task 10
Base Funding

Task 10 – Adoption of Plan

- Planning Group meetings
- Public notices
- Public meetings
- Administrative support
- Base Funding = $254,800

28

Region H
Water Planning Group

Path Forward

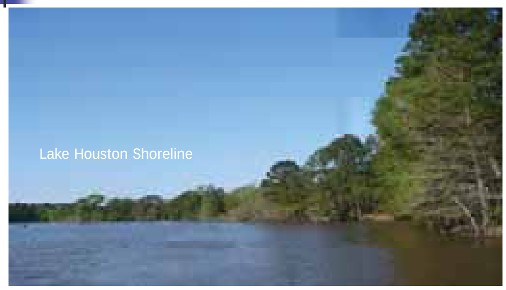
- Revise Scope of Work, if needed, as a result of Public Meeting
- Finalize Scope of Work and Grant Application
- Post Final Grant Application package on Region H website
- Submit Grant Application to TWDB on or before June 13, 2008

29

Lake Houston Source Water Protection Program

City of Houston
Public Utilities Division
Drinking Water Operations

A Healthy Watershed Means Healthy Drinking Water



The Safe Drinking Water Act
Multiple Barrier Approach to Public Health Protection

Drinking Water and Public Health

- What is the role of the Public Utility in Public Health?
- How does safe drinking water benefit the public?
- What disease-causing agents could be present in drinking water?

Drinking Water and Public Health

- What is the role of the Public Utility in Public Health?
  - Drinking water can serve as a vehicle for transmission of hazardous agents causing human health impacts such as:
    - Microbial pathogens;
    - Aquatic organisms;
    - Toxins (Cyanotoxins from blue green algae);
    - Chemicals (man-made);
    - Pesticides and Herbicides (DEET and Atrazine);
    - Metals and other inorganics (arsenic, lead, copper, nitrates, etc.); and
    - Disinfection By Products

Drinking Water and Public Health

- How does safe drinking water benefit the public?
  - Since the Mid-1980's, the number of waterborne disease outbreaks has declined from over 50 incidents per year nationally, to less than 10 in 2001. Most outbreaks today are associated with individual home owner or small community systems.
  - This is believed to be a result of more stringent regulations: i.e. the Surface Water Treatment and Total Coliform Rules
  - The Partnership for Safe Water program is a voluntary EPA program created to help Public Utilities focus on reducing risk even further by improving treatment process efficiencies

Drinking Water and Public Health

- What disease-causing agents could be present in drinking water?
  - Outbreaks are predominantly due to microbial or chemical agents
    - Microbial agents include:
      - Parasites (Giardia, Cryptosporidium);
      - Protozoa (Naeglaria);
      - Bacteria (Coliform, Legionella, Aeromonas); and
      - Viruses (Noro, Coxsackie, Adeno- viruses)
    - Health impacts can be chronic or acute
      - Diarrheal Illnesses
      - Acute gastroenteritis
      - Respiratory infections (Legionnaire's disease)
      - Death

AWWA Source Water Protection Standard

- Program must have:
  - Vision Statement and Goals
  - Geographic delineation of areas of concern
  - Water quality data
  - Potential contaminants associated with land uses
  - Security and emergency preparedness planning
  - Development of Action and Implementation Plans
  - Continual evaluation and revision

Houston's Source Water Program

- Two Needs Identified
  - Source Water Protection *Policy*
  - Source Water Quality Management *Strategy*
    - Total Water Management – Source to Tap

Proposed Source Water Policy

- Implement effective management controls to provide an additional contaminant reduction barrier in source waters

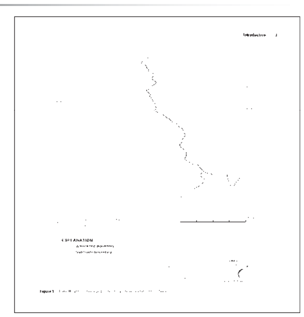
Public Health Risk Management Approach

Proposed Source Water Management Strategy

- Initial focus on Lake Houston Watershed
- Implementation Plan development based on public stakeholder discussions
- Management of source water quality, which includes monitoring, assessment and development of appropriate science based structural and administrative control measures
- Ordinance reinforcement with regards to development permits, storm water and wastewater discharges, and nutrient source uses

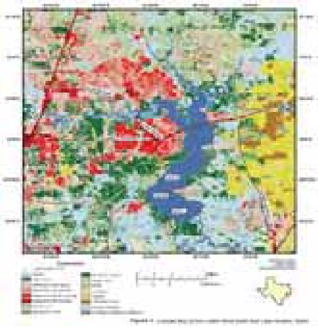
Lake Houston

- Lake Houston watershed, including delineated subbasins and individual tributaries spans 2,835 sq. mi. across 7 Counties.
- All 3 subwatersheds in the Western drainage subbasin are currently impaired for bacteria (303d).



Lake Houston Land Use

- **Red/Purple**: Medium to High intensity development.
- **Yellow**: Pastureland.
- **Brown**: Cultivated Crops.
- **Green/Light Green**: Pine and Deciduous forest.
- **Light Blue**: Woody and Emergent Wetlands.



Protecting Houston's Drinking Water Sources

- Monitoring
  - Lake Houston Sampling Program
    - HGAC/Clean Rivers water quality monitoring of 25 recreational and urban run-off sites
    - USGS fixed and real-time monitoring stations in East Fork of Trinity River, West Fork of San Jacinto River and in Lake Houston

Texas Water Quality Impairments 303 (d) List

Year	Water Segment	Category
2000	Spring and Cypress Creeks	Bacteria
2002	Spring and Cypress Creeks, West Fork San Jacinto River	Bacteria
2004	Spring and Cypress Creeks, West Fork San Jacinto River	Bacteria
2006	Spring and Cypress Creeks, Lake Houston, West and East Fork San Jacinto River, Caney and Peach Creeks	Bacteria
2008 (draft)	Spring and Cypress Creeks, Lake Houston, West and East Fork San Jacinto River, Caney and Peach Creeks	Bacteria

Lake Houston Pathogens

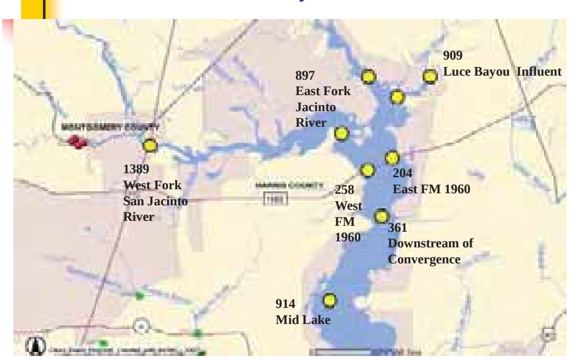
- Background
  - Cryptosporidium was detected in 1998 and 2004 at levels ranging from 0.1 to 0.67 oocysts per liter
  - Giardia has been detected in 2006 and 2007, ranging from 0.067 to 0.3 cysts per liter
  - Internal sampling in October and November 2006 indicated E. coli levels above 100 colonies/100 mL at influent and lake sample locations
  - HGAC study indicates influents from Cypress and Spring Creeks are potential pathogen sources

HGAC Historical Lake Houston Bacteria Data

Criteria Index (126 cfu/100 mL)

Location	*E. coli* (cfu/100mL) (2000-2003)	*E. coli* (cfu/100mL) (2002-2005)
West Fork San Jacinto River	1101	1389
East Fork San Jacinto River	153	897
Luce Bayou	275	908
West FM 1960	208	258
East FM 1960	160	204
Missouri-Pacific Rail Rd	139	361
Mid Lake	493	914

Most Recent Published Bacteria Count in Lake Houston by H-GAC



Lake Houston COH Internal Coliform Sampling 2006

Lake Houston Watershed Special Sampling - November 2006

SAMPLE NUMBER	COLLECTED DATE	COMMENTS	Coliform (Total) Count MPN/100mL	E_Coli Count MPN/100mL	Turbidity - Lab NTU
5104391	11/14/2006	WF@US 59	11235	<50	38.4
5104392	11/14/2006	WF@W.Lake Houston Pkwy	4420	155	35.8
5104409	11/14/2006	WF@ Atascocita Point	7500	465	45.8
5104410	11/14/2006	WF@ FM 1960	2865	50	43.7
5104411	11/14/2006	WF@RR Bridge	1295	<50	49.1
5104412	11/14/2006	Strange's Camp	1470	150	12.7
5104413	11/14/2006	Luce Bayou&EF Convergence	2130	<50	34.0
5104414	11/14/2006	EF@ FM 1960	1705	<50	39.5
5104415	11/14/2006	EF@ RR Bridge	1525	50	47.6
5104416	11/14/2006	Midpoint of RRBridge&NEWPP Intake	1325	<50	50.1

Protecting Houston's Drinking Water Sources

- What is the Connection Between Microbial Contamination and Turbidity?
  - Drinking water treatment plants primarily achieve removal requirements through the filtration process
  - Microorganisms are assumed to attach to particles, and if the particles (as turbidity) can be removed to a high degree, credit is given for treatment efficiency
  - *Therefore, the higher the source water turbidity, and the higher the microbial count in the water, the more pressure on the treatment plant to achieve the required removals, and the higher the health risk to the public*

Protecting Houston's Drinking Water Sources

- Why are Pathogens a Concern?
  - Surface water must be filtered and treated to remove microbial contaminants
  - TCEQ regulations require the following minimum treatment efficiencies for microbial contaminants:
    - Cryptosporidium - 99% (2-log removal)
    - Giardia – 99.9% - (3-log removal)
    - Viruses – 99.99% - (4-log removal)
    - E. coli – 100% - A violation occurs if the presence of E. coli is confirmed

Source Water Quality and Water Treatment Plant Requirements

Raw Water Parameters	Lake Houston (08/05 – 02/08)	Trinity River (01/03 – 02/08)
Turbidity (NTU)	40-150	10-50
TOC (mg/L)	5.0 – 17.0	5.0 – 8.0
Color (pct)	20 – 100	5 - 40
Threshold Odor Number (T.O.N)	6.0 – 8.0	3.0 – 6.0

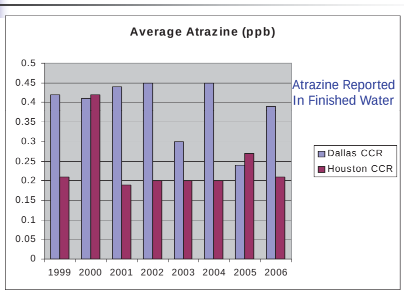
Enhanced Coagulation Removal Requirements

15% -- Raw Water TOC < **4.0** mg/L
35% -- Raw Water TOC < **8.0** mg/L
50% -- Raw Water TOC > **8.0** mg/L

Treatment Goals

Settled Water Turbidity < **2.0** NTU
Color < **5.0** pct
Filtered Water Turbidity < **0.10** NTU
T.O.N < **2.0**

Comparison of Upstream* and Downstream Atrazine Levels



Herbicides exist in Lake Houston

* Dallas is considered upstream to Houston's drinking water supplies

Protecting Houston's Drinking Water Sources

- Increased Treatment Costs for Lake Houston
  - Turbidity Removal
    - *"Enhanced Coagulation" chemical costs* - $20/MG
  - Organics Removal
    - *"Enhanced Coagulation" and carbon chemical costs* - $20/MG
  - Taste and Odor Reduction
    - *Increased carbon costs* - $50/MG
  - Total Increase per MG - $90/MG
    - ✓ ***For Average COH Daily Surface Water Production Rate of 40 MGD an additional $1,300,000 per year in chemical costs occurs to remove contaminants in source water***

Protecting Houston’s Drinking Water Sources

- Increased Treatment Costs for Lake Houston
  - Atrazine Removal
    - *Increased carbon costs* - $50 to $100/MG
  - Additional Disinfection for Pathogen
    - *Use of Ultraviolet (UV) Irradiation – increased electrical costs - $30/MG*
  - Residuals Treatment
    - *Increased solids disposal costs - $20/MG*
  - ***These represent additional increases in operating costs as a result of Lake Houston source water quality***

Protecting Houston’s Drinking Water Sources

- Source Water Program Targeted Parameters
  - Constituents
    1. **Pathogens** – **Primary concern, no treatment process will be 100% effective (**fecal coliforms, Giardia, potential for Cryptosporidium**)**
    2. **Nutrients and Sediments –** Pathogens travel with solids and can re-proliferate with nutrients
    3. **Spills and other Chemical Releases** – Need for operational contingency planning
    4. **Emerging Contaminants** – Atrazine, not removed by conventional treatment

Protecting Houston’s Drinking Water Sources

- Initial Goals
  - Lake Houston
    - Reduction in frequency and quantity of pathogens detected – focus on coliforms
    - Reduction in frequency and quantity of atrazine detected
    - Reduction in severity of seasonal algal blooms by controlling nutrients and in-lake treatment
    - Control of sediments through permitting, partnerships and in-lake treatment
    - Increase visibility in community with sign posting and education efforts

Have not established parameter concentration or loading targets

Lake Houston Targeted Parameter Source Identification

Potential Pollutant Sources

- Stormwater Runoff
- Agricultural Runoff
- Sand and Gravel Operations
- Septic Systems in Rural Northern and Eastern Watersheds
- WWTPs on Spring and Cypress Creeks

Source Water Program

- Tactical Actions

  Implement continual improvement process – as we accomplish objectives, the overall program will be re-evaluated and new targets set, based on improvements realized
  - First Round – Keep it simple
    - Plan for incremental improvements over next 2 to 3 years
    - Leverage public outreach and education opportunities to engage discussion
    - Establish science to support future control measures
    - Begin evaluation of potential land use changes such as acquiring greenbelts or conservation easements

Source Water Program

- Tactical Actions (continued)
  - Management of source water quality
    - Implement expanded monitoring
    - Implement stake holder group to raise issue visibility and educate public
    - Enforce current ordinances
    - Develop TMDL program focusing on stormwater runoff
  - Establish Additional Resources –
    - Increase USGS funding level, double current spending
    - Increase Lake inspection and technical staff to include limnologist and aquatic biologists
    - Increase water quality monitoring staff

Source Water Program

- Stake Holder Group (can consider parameter targets, etc.)
  - Potential Participants:
    - TRA, SJRA, and CWA
    - Texas A&M Agricultural Extension/Soil Conservation
    - Harris County
    - Business, Civic, Environmental, Academic
- Lake Houston Ordinances
    - Enforce septic discharge and marine structure ordinances
      - Increase inspections focusing on water quality
    - Ordinance reinforcement in regards to organics, sediments and nutrients (development permits, storm water and wastewater discharges, and nutrient source uses)

Region H
Water Planning Group

Region H Water Planning Group

Consultants Report

May 28, 2008

Region H
Water Planning Group

Environmental Flows Investigation: Impacts of Recommended Water Management Strategies on Galveston Bay Estuary

Region H
Water Planning Group

Introduction

- Water Availability Models Developed
  - Base conditions
  - Individual strategies
  - All strategies

Region H
Water Planning Group

Introduction

Modeled Water Management Strategies

- Expanded Use of Groundwater ~ 91,000 ac-ft/yr
- BRA System Operations ~ 119,000 ac-ft/yr
- Allens Creek Reservoir ~ 97,000 ac-ft/yr
- Little River Off-Channel Reservoir ~ 32,000 ac-ft/yr
- Industrial Wastewater Reuse ~ 67,000 ac-ft/yr
- TRA to Houston Contract ~ 153,000 ac-ft/yr
- TRA to SJRA Contract ~ 50,000 ac-ft/yr
- Houston to GCWA Contract ~ 56,000 ac-ft/yr
- Houston Indirect Reuse ~ 61,000 ac-ft/yr
- NHCRWA Indirect Reuse ~ 31,400 ac-ft/yr
- Lake Houston Additional Yield ~ 1,000 ac-ft/yr
- Freeport Seawater Desalination ~ 28,000 ac-ft/yr

Region H
Water Planning Group

Introduction

- Several strategies not modeled
  - Municipal and Irrigation Conservation
  - Expand / Increase Current Contracts
  - New Contracts from Municipal Supply
  - Non-Municipal Contractual Transfers
- Reasons
  - WRAP considers rights / diversions, not contracts
  - “Contract” water already diverted
  - Conserved water utilized at another location

Region H
Water Planning Group

B&E Flow Analysis

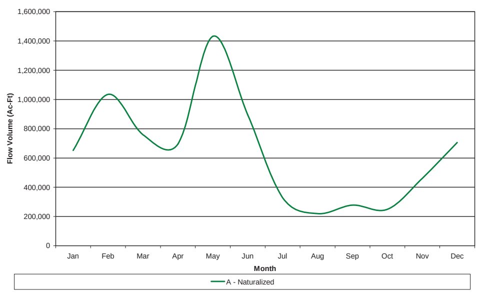
Model Scenarios

Scenario		Diversions	Return Flows	Upstream Strategies?	Reservoir Storage
A	Naturalized Flows	N/A	N/A	No	N/A
B	Existing Conditions	10-Yr Max Use	Current Assumed	No	Year 2000
C	Current Conditions + Full Diversions	Full Permit	Current Assumed	No	Year 2000
D	Future 2060 Conditions	Full Permit	Current Assumed	YES	Year 2060
D + Strategies	Future 2060 Conditions + Individual Strategies	Full Permit + Strategies	Current Assumed + Strategies	YES	Year 2060
E	Future 2060 + ALL Strategies	Full Permit + All Strategies	Current Assumed + All Strategies	YES	Year 2060
F	TCEQ Permit Run	Full Permit	None	No	Original ACE

Region H
Water Planning Group

Median B&E Inflows

A Model – Naturalized Conditions

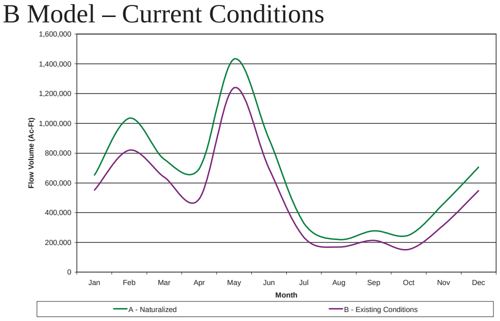


7

Region H
Water Planning Group

Median B&E Inflows

B Model – Current Conditions

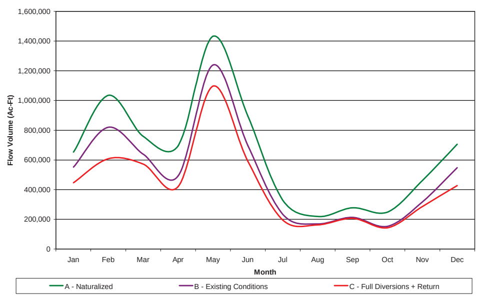


8

Region H
Water Planning Group

Median B&E Inflows

C Model – Full Diversions w/ Return Flows

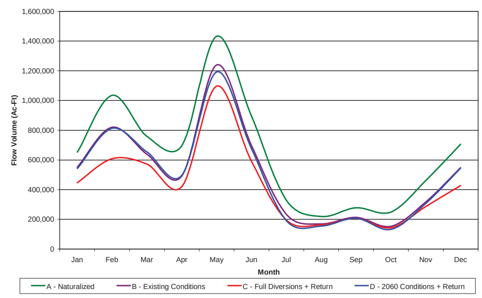


9

Region H
Water Planning Group

Median B&E Inflows

D Model – Future Conditions

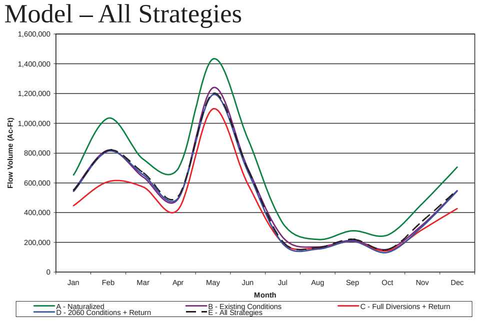


10

Region H
Water Planning Group

Median B&E Inflows

E Model – All Strategies

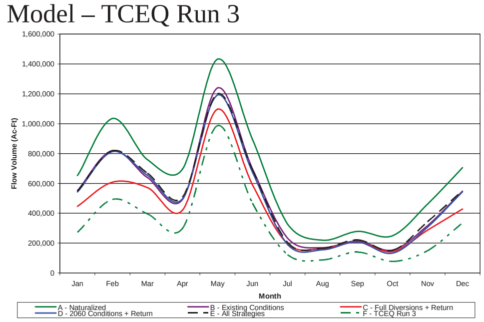


11

Region H
Water Planning Group

Median B&E Inflows

F Model – TCEQ Run 3



12

TWDB Inflow Targets

- Max H – Inflows required for maximum bay and estuary fisheries harvest as recommended by TWDB/TPWD.
- Min Q – Minimum inflow required to maintain the bay and estuary fisheries harvest as recommended by TWDB/TPWD.
- Min Q-Sal – Minimum acceptable inflow required to maintain the salinity needed for bay and estuary fisheries production as recommended by TWDB/TPWD.

TWDB Inflow Targets

Month	Max H	Min Q	Min Q-Sal
January	150,500	150,500	150,490
February	155,200	216,700	216,700
March	652,800	363,900	363,900
April	632,500	352,600	267,270
May	1,273,700	679,700	309,970
June	839,700	448,100	413,560
July	211,500	232,700	211,500
August	140,000	154,000	140,000
September	103,000	330,200	102,960
October	78,600	251,900	78,600
November	351,500	351,500	164,390
December	626,800	626,800	93,870
TOTAL	5,215,800	4,158,600	2,513,210

Inflow Frequencies

- Based on the percentage of flow records meeting or exceeding the monthly inflow target.
- Statistics for longer period (seasonal, annual) are composed of averages of the monthly percentiles

Annual Inflow Frequencies

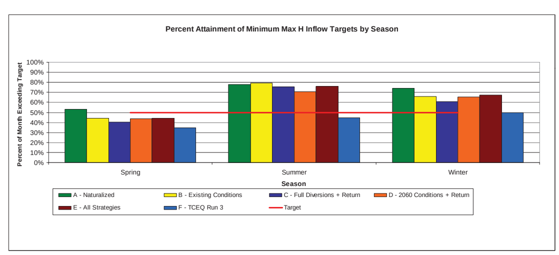
Scenario	Max H	Min Q	Min Q-Sal
GBFIG Recommendation	50%	60%	75%
A - Naturalized	68%	67%	83%
B – Current Conditions	63%	58%	79%
*C – Full Diversion	59%	53%	75%
*D – 2060 Conditions	60%	56%	74%
*E – All Strategies	62%	59%	77%
F – TCEQ Run 3	43%	43%	56%

*C, D, and E scenarios include return flows.

Alternative Examination of Inflow Frequency

- Seasonally – 3 Seasons
  - Spring: March - June
  - Summer: July - October
  - Winter: November - February
- Monthly

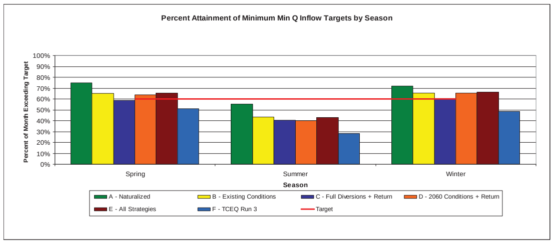
Seasonal Max H



Region H
Water Planning Group

B&E Inflow Targets

Seasonal Min Q

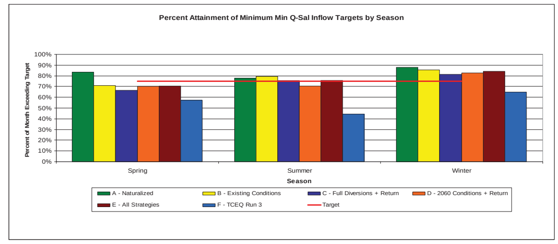


19

Region H
Water Planning Group

B&E Inflow Targets

Seasonal Min Q-Sal

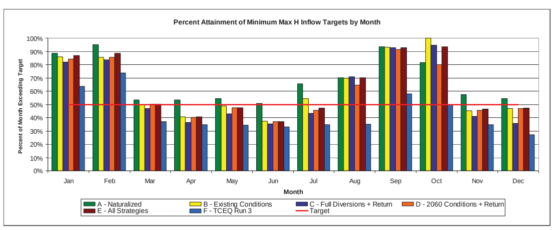


20

Region H
Water Planning Group

B&E Inflow Targets

Monthly Max H

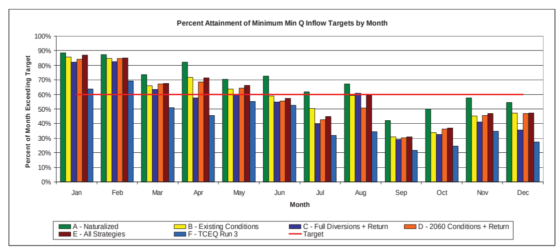


21

Region H
Water Planning Group

B&E Inflow Targets

Monthly Min Q

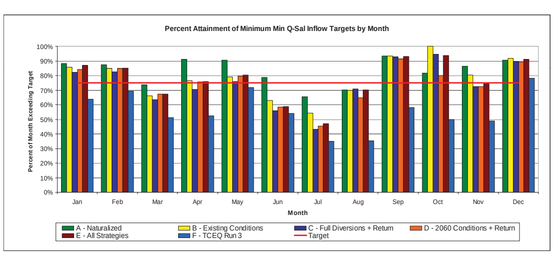


22

Region H
Water Planning Group

B&E Inflow Targets

Monthly Min Q-Sal



23

Region H
Water Planning Group

B&E Inflow Targets

Annual Inflow Deficits

Deficit between All Strategies Model (E) and Base Models

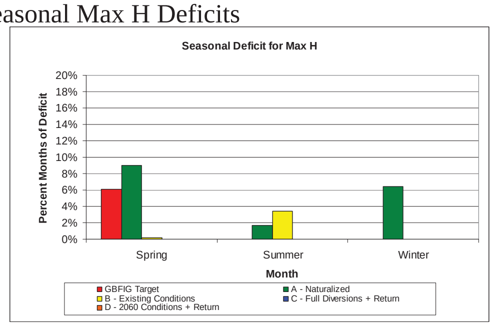
Scenario	Max H	Min Q	Min Q-Sal
GBFIG Recommendation	0%	1%	0%
A - Naturalized	6%	8%	6%
B – Current Conditions	1%	0%	2%
C – Full Diversion	0%	0%	0%
D – 2060 Conditions	0%	0%	0%

24

Region H
Water Planning Group

B&E Inflow Targets

Seasonal Max H Deficits

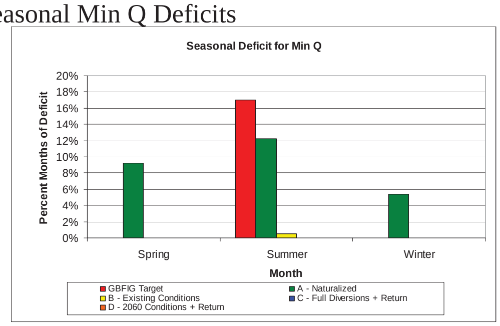


25

Region H
Water Planning Group

B&E Inflow Targets

Seasonal Min Q Deficits

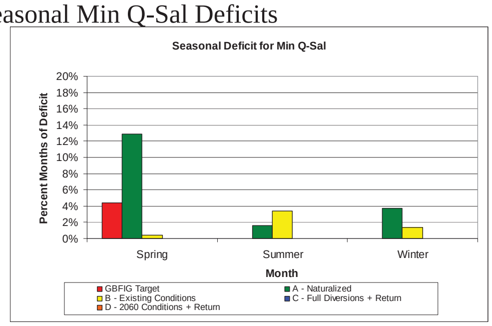


26

Region H
Water Planning Group

B&E Inflow Targets

Seasonal Min Q-Sal Deficits

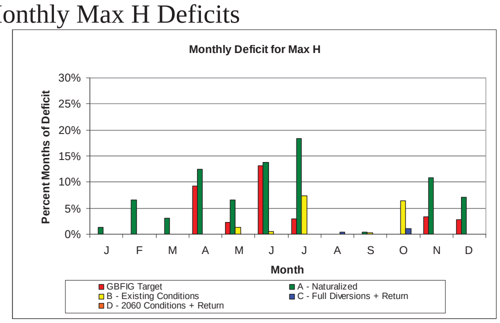


27

Region H
Water Planning Group

B&E Inflow Targets

Monthly Max H Deficits

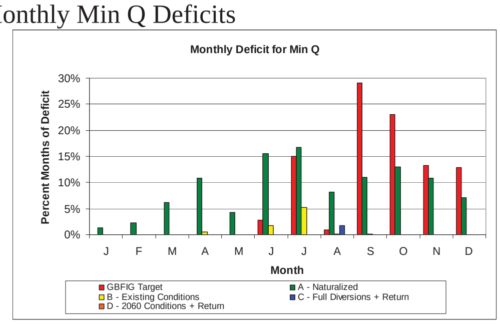


28

Region H
Water Planning Group

B&E Inflow Targets

Monthly Min Q Deficits

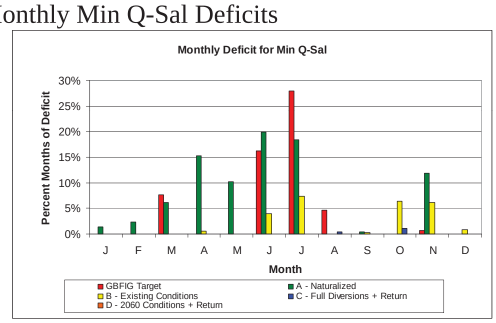


29

Region H
Water Planning Group

B&E Inflow Targets

Monthly Min Q-Sal Deficits



30

Region H
Water Planning Group

Individual Strategies

Examination of Selected Strategies

- All modeled strategies were modeled separately to determine individual impacts
- The impacts of each strategy contributed only a minor variation to the base model (Scenario D)
- The largest individual strategy modeled was TRA to Houston Contract (Scenario D_{12}) at 153,000 Ac-Ft/Yr

Region H
Water Planning Group

Individual Strategies

Annual Inflow Frequencies – Selected Strategies

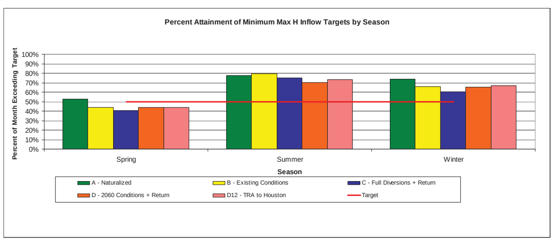
Scenario	Max H	Min Q	Min Q-Sal
GBFIG Recommendation	50%	60%	75%
A - Naturalized	68%	67%	83%
B – Current Conditions	63%	58%	79%
*C – Full Diversion	59%	53%	75%
*D – 2060 Conditions	60%	56%	74%
*D_{12} – TRA to Houston	61%	58%	76%

*C and D scenarios include return flows.

Region H
Water Planning Group

Individual Strategies

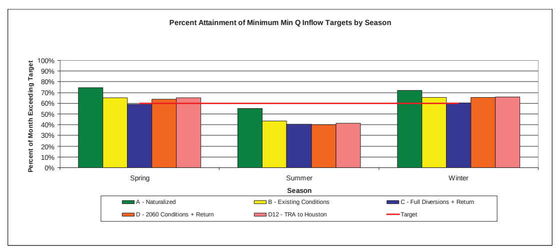
Seasonal Max H – Selected Strategies



Region H
Water Planning Group

Individual Strategies

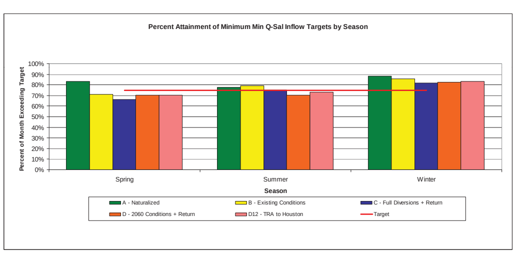
Seasonal Min Q – Selected Strategies



Region H
Water Planning Group

Individual Strategies

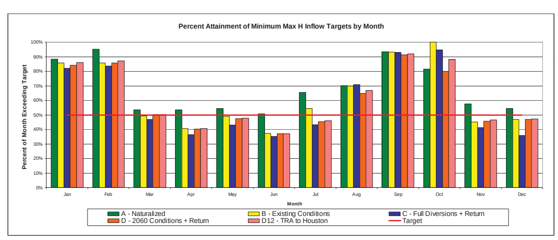
Seasonal Min Q-Sal – Selected Strategies



Region H
Water Planning Group

Individual Strategies

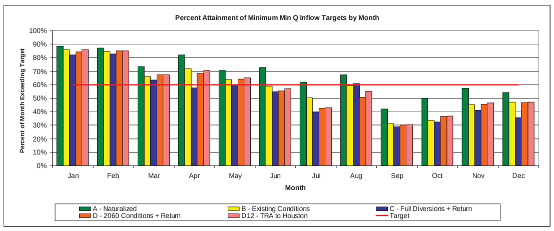
Monthly Max H – Selected Strategies



Region H
Water Planning Group

Individual Strategies

Monthly Min Q – Selected Strategies

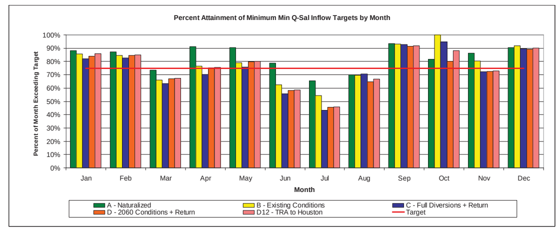


37

Region H
Water Planning Group

Individual Strategies

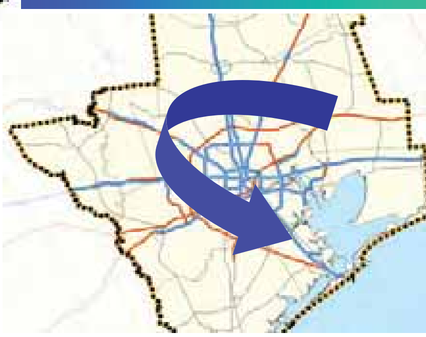
Monthly Min Q-Sal – Selected Strategies



38

Region H
Water Planning Group

B&E Inflow Location

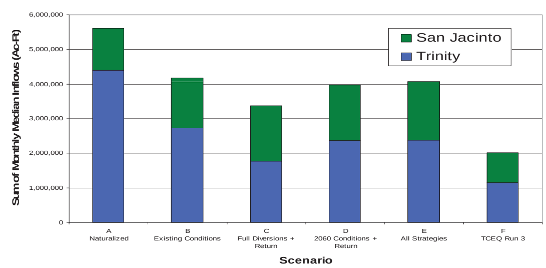


39

Region H
Water Planning Group

B&E Inflow Location

Location of Galveston Bay Inflows



40

Region H
Water Planning Group

Summary

- Upstream strategies and Region H strategies have unique impacts on inflows at different times of the year.
- How should frequency targets be evaluated? Annually? Seasonally? Monthly? On a multi-year basis?
- The impacts for any single individual Region H management strategy appear to be negligible in comparison to other conditions.

41

Region H
Water Planning Group

Interruptible Supplies

Region H
Water Planning Group

Task 3 - Interruptible Supplies

Key Question *- Can a strategy of substituting permitted or un-permitted interruptible (a.k.a. non-firm) surface water supplies for use in irrigated agricultural (or other appropriate uses) for permitted firm surface water supplies that are currently allocated to irrigated agricultural be employed to increase the availability of firm surface water supplies for municipal or industrial use?*

Interruptible Water Supply *– 75% of the water must be available 75% of the time measured as:*

- *75% of the water must be available in 75% of the years over the period of record; or*
- *100% of the water must be available 75% of the months over the period of record*

43

Region H
Water Planning Group

Task 3 - Interruptible Supplies

Hydrologic Viability Analysis

- Available interruptible water supply in proximity to irrigation demands:
  - Un-permitted supplies
  - Existing permitted interruptible water to "trade"
- Firm irrigation supplies in proximity to or otherwise reasonably accessible by M&I users

44

Region H
Water Planning Group

Task 3 - Interruptible Supplies

Viable Interruptible Supply Strategy Requires:

- Available interruptible water supply in proximity to irrigation demands:
  - Quantify ***existing permitted*** supplies
  - Quantify ***new un-permitted interruptible supplies*** – with and without environmental flows
  - Evaluate ***potential uses*** for interruptible water supplies
  - Compare ***amounts and locations*** of interruptible supplies and demands to evaluate viability of interruptible supply use
- Firm irrigation supplies in proximity to or otherwise reasonably accessible by M&I users
  - Quantify ***additional firm yield supplies*** made available for M&I use

45

Region H
Water Planning Group

Task 3 Interruptible Supplies Municipal and Industrial Demands

Summary of Surface Water M&I Demands (AFY)

Basin	2010 WUG Demands Currently Supplied	2060 Unmet Demands with WMS's Applied	2060 Unmet Demands with NO WMS's Applied
Brazos	178,033	0	220,805
Brazos - Colorado	12,497	0	3,965
Neches - Trinity	8,153	0	0
San Jacinto	725,429	0	535,555
San Jacinto - Brazos	340,395	0	69,888
Trinity	24,644	0	3,490
Trinity - San Jacinto	56,176	0	58,725

46

Region H
Water Planning Group

Task 3 Interruptible Supplies: Existing Permits

"Quantify availability of existing permitted water"

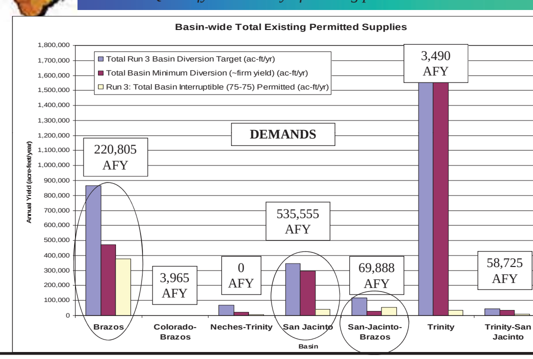
Shows locations of existing irrigation permits

47

Region H
Water Planning Group

Task 3 Interruptible Supplies Permitted Supplies

"Quantify availability of existing permitted water"

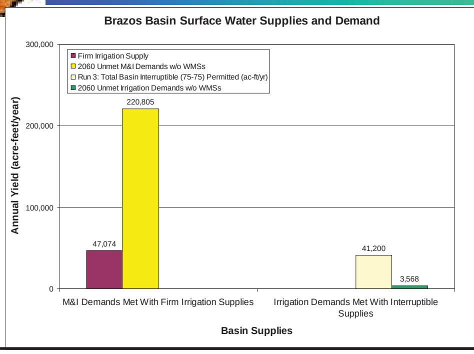


48

Region H
Water Planning Group

Task 3 Interruptible Supplies: Permitted Supplies

"Quantify availability of existing permitted water"

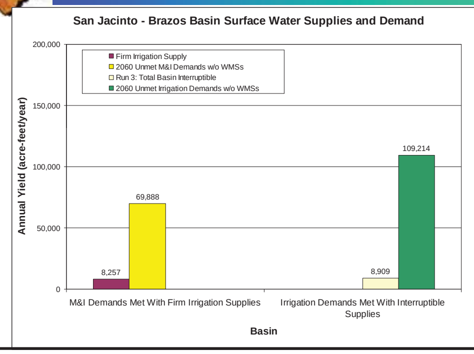


49

Region H
Water Planning Group

Task 3 Interruptible Supplies: Permitted Supplies

"Quantify availability of existing permitted water"

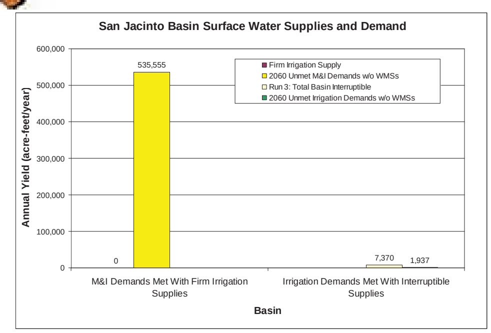


50

Region H
Water Planning Group

Task 3 Interruptible Supplies: Permitted Supplies

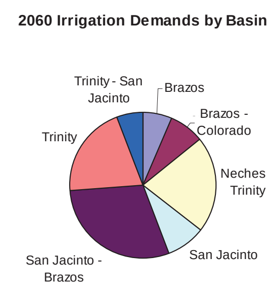
"Quantify availability of existing permitted water"



51

Region H
Water Planning Group

Task 3 Interruptible Supplies Irrigation Demands



52

Region H
Water Planning Group

Task 3 Interruptible Supplies Irrigation Demands

"Quantify potential uses for interruptible water supplies"

Regional Crop Types:

- In 2002, rice production accounted for approximately 72% of irrigated acreage in Region H counties
- Relatively small amount of irrigated acreage in corn, sorghum, cotton, hay
- In 2002 approximately 21% of irrigation was supplied from groundwater (Region H weighted average)
- Total irrigation demand has decreased by more than 50% from 1987 to 2002

53

Region H
Water Planning Group

Task 3 Interruptible Supplies Irrigation Demands

"Quantify potential uses for interruptible water supplies"

54

Region H
Water Planning Group

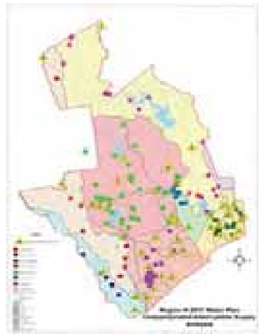
Task 3 Interruptible Supplies
Un-Permitted Calculations

"Quantify new un-permitted interruptible supplies"

Locations selected (yellow triangles) where amount of un-permitted interruptible flow would be quantified.

Both an upstream and downstream location were selected to bracket results (max and min).

These flows could meet irrigation demands.

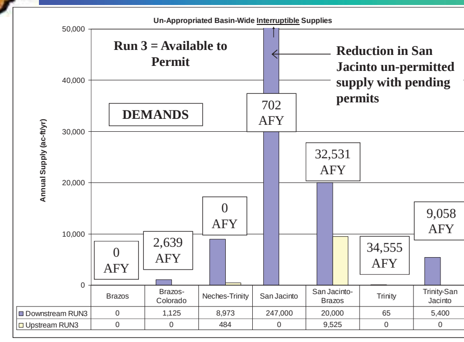


55

Region H
Water Planning Group

Task 3 Interruptible Supplies:
Un-Permitted Calculations

"Quantify new un-permitted interruptible supplies"

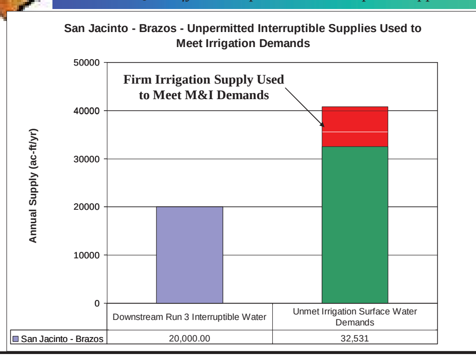


56

Region H
Water Planning Group

Task 3 Interruptible Supplies
Un-Permitted Calculations

"Quantify new un-permitted interruptible supplies"



57

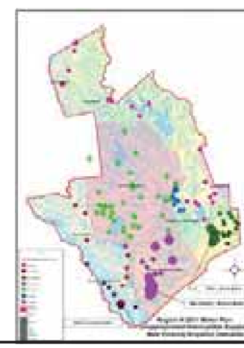
Region H
Water Planning Group

Task 3 Interruptible Supplies
Un-Permitted Calculations

"Compare amounts and locations of interruptible supplies and demands"

Existing irrigation demand points where amounts and locations of interruptible supplies and demands were compared

Available un-permitted interruptible supplies are restricted to downstream segments of Coastal Basins



58

Region H
Water Planning Group

Task 3 Interruptible Supplies
Un-Permitted Calculations

"Compare amounts and locations of interruptible supplies and demands"

Basin	Un-Permitted Interruptible Supply Near Existing Irrigation Demands (ac-ft/yr)
Brazos	–
Colorado - Brazos	<700, one location only
Neches - Trinity	75 to 530 in four locations
San Jacinto	–
San Jacinto - Brazos	2,200 to 15,000 in 11 locations
Trinity	–
Trinity - San Jacinto	–

59

Region H
Water Planning Group

Task 3 Interruptible Supplies
Un-Permitted Calculations

"Compare amounts and locations of interruptible supplies and demands"

Impacts of Instream Flow Requirements:

- Instream flow requirements added with priority senior to new permits, junior to existing permits
- Instream flows based on Lyons Method

60

Region H
Water Planning Group

Task 3 Interruptible Supplies Un-Permitted Calculations

"Compare amounts and locations of interruptible supplies and demands"

Availability of Un-Permitted Interruptible Supply With and Without Environmental Flow Requirements

Basin	Without Environmental Flow Requirement	With Environmental Flow Requirement
Brazos	–	–
Colorado - Brazos	<700 ac-ft/yr in one location	TBD
Neches - Trinity	75 to 530 ac-ft/yr in four locations	TBD
San Jacinto	–	–
San Jacinto - Brazos	2,200 to 15,000 ac-ft/yr in 11 locations (max 20,000 total)	TBD
Trinity	–	–
Trinity - San Jacinto	–	–

61

Region H
Water Planning Group

Task 3 - Interruptible Supplies SUMMARY

Hydrologic Viability Analysis Summary

- Available interruptible water supply in proximity to irrigation demands:
  - Un-permitted supplies
  - Existing permitted interruptible water to "trade"
- Firm irrigation supplies in proximity to or otherwise reasonably accessible by M&I users

62

Region H
Water Planning Group

Task 3 Interruptible Supplies: Summary

Available interruptible water near irrigation demands

- San Jacinto - Brazos has some (between 2,200 and 15,000 ac-ft/yr) water available on interruptible basis at 11 existing demand locations.
  - Maximum potential total water WITHOUT environmental flow constraints is 20,000 acre-ft/yr
  - Maximum potential total water WITH environmental flow constraints is (TBD) acre-ft/yr
- San Jacinto Basin has 0 acre-ft interruptible supply at existing irrigation demands – all of the 247,000 supply is at the downstream extreme of the basin and subject to pending permit applications
- In the Brazos Basin, existing permitted supplies have large interruptible component and there are no un-permitted supplies
- In other basins, existing demand locations do not match location of un-permitted flows.

63

Region H
Water Planning Group

Task 3 Interruptible Supplies: Summary

Firm irrigation supplies in proximity to or otherwise reasonably accessible by M&I users

- Majority of permitted firm irrigation supply is in Trinity Basin – but very little M&I demand and no un-permitted replacement supplies
- Brazos basin has 47,000 ac-ft/yr firm irrigation supply but no un-permitted replacement supplies
- San Jacinto has large un-permitted replacement supply (pending permits) but zero firm irrigation supplies
- San Jacinto – Brazos basin has 8,200 ac-ft/yr firm irrigation supply and a total 20,000 ac-ft/yr un-permitted replacement supplies

64

Region H
Water Planning Group

Task 3 Interruptible Supplies: Conclusions

Conclusions

- Hydrologic viability only in San Jacinto – Brazos
- Interbasin transfers not practical for interruptible supplies
- Imposing environmental flow constraints would further reduce viability of strategy

65

Region H
Water Planning Group

Task 3 Interruptible Supplies: Next Phase

Next Phase of Analysis: Policy Implications

- Survey of major irrigation interests?
- Identify and assess regulatory and institutional issues and constraints?
- Evaluate the impacts and timing of the use of interruptible supplies on the size and timing of other water management strategies?
- Determine if impacts are reasonable?
- Evaluate and quantify the economic impacts of this strategy?

66

Appendix 10C

Public Hearing Materials
May 6, 2009

This Page Intentionally
Left Blank

Contents – May 6, 2009 Public Meeting

1. **Public Notice**
2. **Presentation**

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-1111 Facsimile 936-588-3043

Notice of Public Meeting and Opportunity to Comment on Proposed Population and Water Demand Projections to Update the Region H Regional Water Plan

April 17, 2009

The 15-county Region H Water Planning Group (RHWPG) is preparing an updated Regional Water Plan which will be submitted to the Texas Water Development Board (TWDB) in 2011. The TWDB will consolidate the reports from the 16 Regional Water Planning Areas and report to the Texas Legislature not later than January 2012.

The 2011 Regional Water Plan will be based on population and water demands prepared by the Texas Water Development Board for use in the 2006 Water Plan. In a limited number of cases, the 2006 projections will be revised to reflect documented changed conditions. Water User Groups (WUGs) have previously been contacted to review the projections for their areas. A summary of the proposed projected population and water demands for area WUGs can be found at the RHWPG website (www.regionhwater.org).

In accordance with rules of the Texas Water Development Board, the RHWPG will receive comments from the public on the proposed population and water demand projections during its regular meeting to be held at 10:00 a.m., May 6, 2009, at the SJRA offices, 1577 Damsite Road, Conroe, Texas. Action on the proposed projections may be taken at that meeting. Comments may also be submitted by mail to the SJRA at the address below. Comments and documentation of requested changes must be received by May 21, 2009.

Reed Eichelberger, PE, General Manager
San Jacinto River Authority
P.O. Box 329
Conroe, Texas 77305-0329

The current (2006) Region H Water Plan and draft materials for the 2011 Plan are available on the RHWPG website at www.regionhwater.org. The 2006 Plan is also available on the TWDB website at www.twdb.state.tx.us.

For further information, please contact Glenda Callaway, 713-520-9031.

Region H Water Planning Group

May 6, 2009

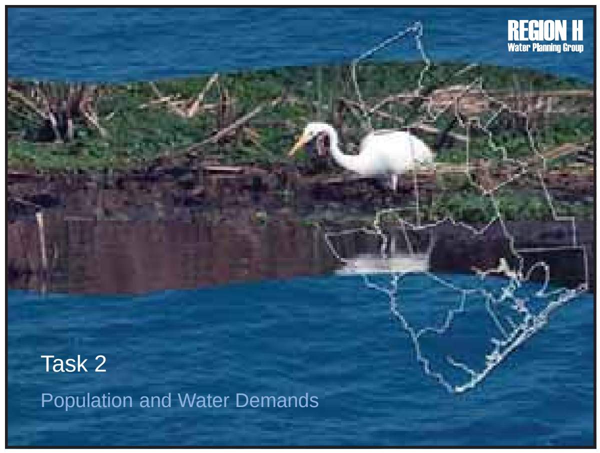
San Jacinto River Authority

2011 Regional Water Plan Schedule

Date	Event	Items Due
02/04/09	*RWPG Meeting*	*No Deliverables*
05/06/09	**RWPG Meeting**	**Population and Water Demand Projections for Consideration by RWPG**
07/01/09	RWPG Meeting	Draft Chapters 2 and 3; Proposed Recommendations and Strategies for Consideration by RWPG
09/02/09	RWPG Meeting	Draft Chapters 4, 5, and 8
10/07/09	RWPG Meeting	Draft Chapters 1, 6, 7, and 9
12/02/09	RWPG Meeting	Draft Initially Prepared Plan
03/01/10	Due Date	Draft Final Initially Prepared Plan
09/01/10	Due Date	Regional Water Plan

Focus for Today's Meeting

- Task 2 – Population and Water Demands
  - Review revised population and water demand projections for the 2011 RWP.
  - Receive public comment on revised projections.
  - Take action to approve revised projections.
- Task 3 – Water Supply Analysis
  - Review procedures and activities for completion of the 2011 RWP.
- Task 4 – Water Management Strategy Selection
  - Present WMA selection methodology.
  - Take action to approve selection methodology.



Task 2

Population and Water Demands

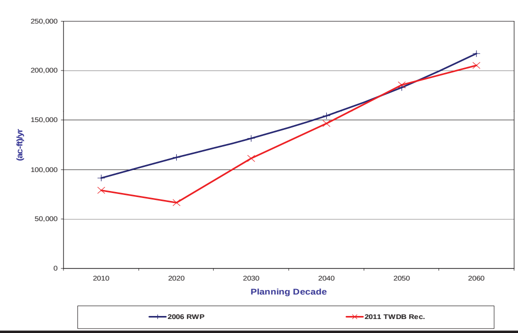
Task 2 – Population and Water Demands

Items for Consideration

- Steam-Electric Demands
- Population Projections
- Municipal Water Demands
- Approval of all Water Demand Projections

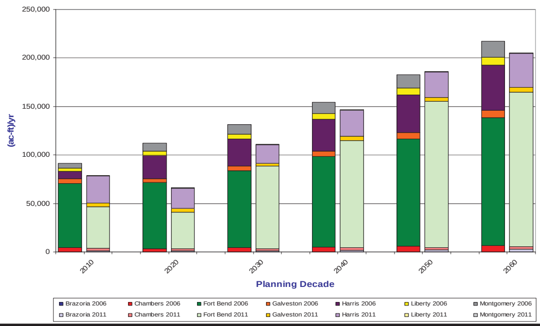
Task 2 – Population and Water Demands

Steam-Electric Demand Alternatives



Steam-Electric Demands by County

Steam-Electric Demand Alternatives



Task 2 – Population and Water Demands

Steam-Electric Demand Recommendation

- In general, the total regional steam-electric demands in the 2006 RWP are greater than those proposed for this round
- The methodology used for developing the revised projections result in a decrease in demand in the 2020 decade
- Recommend the retention of the 2006 RWP values for this round of planning

Task 2 – Population and Water Demands

Projection Methodology

- County Population Projections
- WUG-Level Population Projections
  - TWDB-produced alternative projections
  - Input from WUGs
  - Data from Groundwater Reduction Plans
- Municipal Demand Projections
  - Developed by TWDB from Region H population projections
  - Per capita water usage based on baseline Year 2000 TWDB Water Use Survey

Task 2 – Population and Water Demands

County Projection Methodology

- County Control Populations
  - Applied changes to counties with growth greater than 5% of the 2006 RWP projection
    - Harris County did not meet the 5% threshold although it was included due to magnitude of increase
  - Applying change in population as a one-time occurrence
    - Harris County
  - Applying percent change in population as a long-term trend
    - Brazoria, Chambers, Fort Bend, and Montgomery Counties

Task 2 – Population and Water Demands

2008 Projections from Texas State Data Center

- Basis for comparing Region H projections
- Cohort-component projection technique for counties
  - Calculates projections for groups of persons with common characteristics (cohorts)
- For each cohort, projection based on:
  - Base population
  - Birth rate
  - Death rate
  - Migration rate

Task 2 – Population and Water Demands

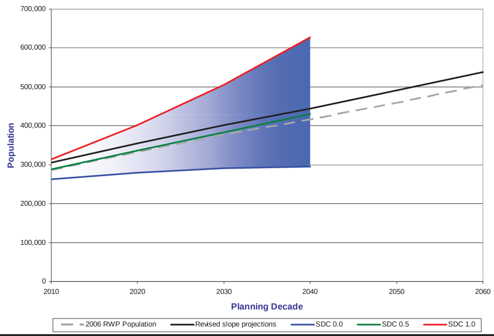
2008 Projections from Texas State Data Center

- Developed projections through 2040 based on 3 migration rate scenarios:
  - 0.0 – Assumes in-migration and out-migration are equal
  - 0.5 – Assumes net migration of ½ the 1990 to 2000 rate
  - 1.0 – Assumes net migration rate for 1990 to 2000 continues

Task 2 – Population and Water Demands

REGION H Water Planning Group

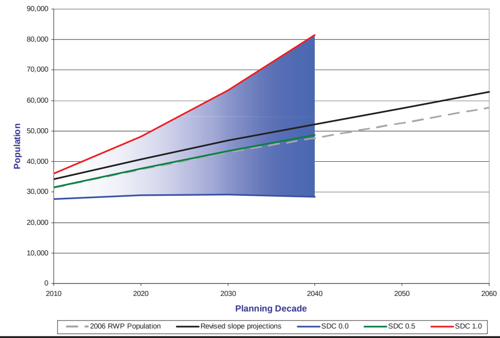
Revised Brazoria County Control Population



Task 2 – Population and Water Demands

REGION H Water Planning Group

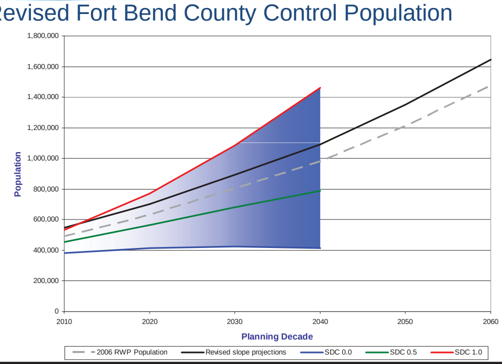
Revised Chambers County Control Population



Task 2 – Population and Water Demands

REGION H Water Planning Group

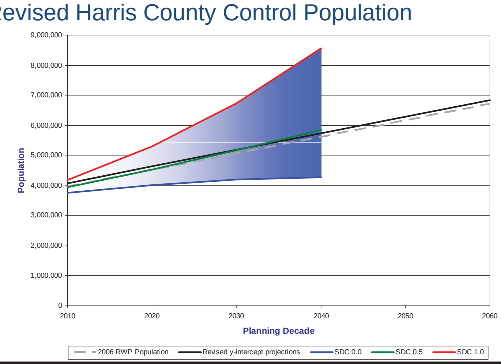
Revised Fort Bend County Control Population



Task 2 – Population and Water Demands

REGION H Water Planning Group

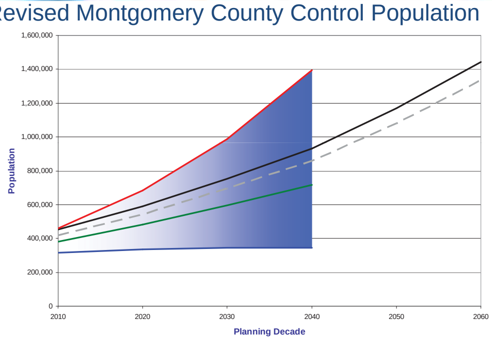
Revised Harris County Control Population



Task 2 – Population and Water Demands

REGION H Water Planning Group

Revised Montgomery County Control Population



Task 2 – Population and Water Demands

REGION H Water Planning Group

WUG-Level Populations

- Surplus county population (in excess of 2006 RWP values) first distributed to new WUGs and WUGs with known demand revisions
- Applied remaining surplus based on county:
  - Brazoria – No surplus
  - Chambers – Distributed to Trinity Bay Conservation District because 2006 RWP County-Other showed no growth through 2060
  - Fort Bend – No surplus
  - Harris – Surplus represented in County-Other
  - Montgomery – Allocated to all County-Other and utility WUGs based on rate of growth in 2006 RWP

Task 2 – Population and Water Demands

REGION H Water Planning Group

Municipal Demand Projections

- Developed from population projections provided to TWDB
- In general, use per capita demand from 2006 RWP
- Include limited conservation savings from conservation programs, resulting in a decreasing per capita demand over time

Task 2 – Population and Water Demands

REGION H Water Planning Group

Survey Results

WUGs given the opportunity to review projections.

- Developed online database to receive WUG responses
- Received 29 responses from 232 mail-outs – 12.5%
- WUGs informed of criteria to revise projections
  - Credible population estimates such as SDC, expanded service areas
  - More representative DOR condition for per capita demands
- Redeveloped population and demand projections based on input from WUGs

Task 2 – Population and Water Demands

REGION H Water Planning Group

Survey Results

29 WUGs that responded to Survey by Deadline

10 WUGs requested Changes

- 9 WUGs requested population changes
  - City of Montgomery
  - City of Panorama Village
  - City of Sugar Land
  - Crosby MUD
  - Fort Bend County MUD #67
  - Fort Bend County MUD #69
  - Montgomery County MUD #8
  - Montgomery County MUD #9
  - Riverside WSC
- 6 WUGs requested per capita changes
  - City of Montgomery
  - City of Panorama Village
  - City of Sugar Land
  - Fort Bend County MUD #67
  - Fort Bend County MUD #69
  - North Fort Bend Water Authority

19 WUGs approved the projections provided in the mail-out

Task 2 – Population and Water Demands

REGION H Water Planning Group

WUG Population Requests – Fort Bend County

WUG	Projection	2010	2020	2030	2040	2050	2060
FBC MUD #67	Draft	3,306	3,306	3,306	3,306	3,306	3,306
	WUG	3,759	3,759	3,759	3,759	3,759	3,759
FBC MUD #69	Draft	1,701	1,701	1,701	1,701	1,701	1,701
	WUG	2,086	2,086	2,086	2,086	2,086	2,086
Sugar Land	Draft	89,426	89,426	89,426	89,426	89,426	89,426
	WUG	83,819	101,422	105,000	105,000	105,000	105,000

- Adjustments were made to the County-Other WUG to account for the net differences except for Fort Bend County Planning Decade 2020.

Task 2 – Population and Water Demands

REGION H Water Planning Group

WUG Population Requests – Harris County

WUG	Projection	2010	2020	2030	2040	2050	2060
Crosby MUD	Draft	3,162	3,162	3,162	3,162	3,162	3,162
	WUG	4,734	5,184	5,634	6,084	6,534	6,984

- Adjustments were made to the County-Other WUG to account for the net differences.

Task 2 – Population and Water Demands

REGION H Water Planning Group

WUG Population Requests – Montgomery County

WUG	Projection	2010	2020	2030	2040	2050	2060
MC MUD #8	Draft	4,702	5,435	7,084	9,021	11,577	14,548
	WUG	4,060	5,336	6,532	6,967	6,886	6,829
MC MUD #9	Draft	3,290	3,936	5,388	7,093	9,345	11,962
	WUG	2,840	3,864	4,968	5,478	5,559	5,616
Panorama Village	Draft	2,538	2,888	3,572	3,913	3,913	3,913
	WUG	2,160	2,281	2,402	2,523	2,644	2,765
Montgomery	Draft	927	1,290	1,729	2,213	2,851	3,592
	WUG	1,200	5,000	7,500	10,000	12,500	15,000

- Adjustments were made to the County-Other WUG to account for the net differences.

Task 2 – Population and Water Demands

WUG Population Requests – San Jacinto County

WUG	Projection	2010	2020	2030	2040	2050	2060
Riverside WSC	Draft	1,887	2,542	3,066	3,393	3,582	3,668
	WUG	2,017	2,542	3,066	3,950	4,485	5,011

- Adjustments were made to the County-Other WUG to account for the net differences.

Task 2 – Population and Water Demands

WUG Population Requests – Walker County

WUG	Projection	2010	2020	2030	2040	2050	2060
Riverside WSC	Draft	4,184	4,612	4,819	4,768	4,780	4,780
	WUG	4,472	4,612	4,819	5,550	5,985	6,530

- Adjustments were made to the County-Other WUG to account for the net differences.

Task 2 – Population and Water Demands

Published Projections

- Posted on Region H Water website on April 22 for public review and comment
- Include all requests for changes made up to deadline
- Detailed WUG-level projections provided in handouts
- These projections have been informally reviewed by TWDB for future consideration

Task 2 – Population and Water Demands

Water Demand – Austin County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*27,173*	*30,574*	*32,946*	*34,355*	*35,031*	*35,958*
		2011	*27,173*	*30,574*	*32,946*	*34,355*	*35,031*	*35,958*
Water Demand (Ac-Ft/Yr)	Municipal	2006	3,918	4,258	4,494	4,590	4,639	4,756
		2011	**4,123**	**4,658**	**5,027**	**5,191**	**5,278**	**5,446**
	Irrigation	2006	10,617	10,617	10,617	10,617	10,617	10,617
		2011	10,617	10,617	10,617	10,617	10,617	10,617
	Livestock	2006	1,615	1,615	1,615	1,615	1,615	1,615
		2011	1,615	1,615	1,615	1,615	1,615	1,615
	Manufacturing	2006	210	233	253	272	288	313
		2011	210	233	253	272	288	313
	Mining	2006	51	56	59	62	65	67
		2011	51	56	59	62	65	67
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**16,411**	**16,779**	**17,038**	**17,156**	**17,224**	**17,368**
		2011	**16,616**	**17,179**	**17,571**	**17,757**	**17,863**	**18,058**

Task 2 – Population and Water Demands

Water Demand – Brazoria County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*285,850*	*331,731*	*375,664*	*416,157*	*459,078*	*503,894*
		2011	*305,649*	*354,708*	*401,684*	*444,981*	*490,875*	*538,795*
Water Demand (Ac-Ft/Yr)	Municipal	2006	44,685	50,822	56,754	62,022	68,202	74,967
		2011	**47,184**	**53,523**	**59,656**	**65,134**	**71,567**	**78,598**
	Irrigation	2006	135,033	123,115	118,544	115,788	115,788	115,788
		2011	135,033	123,115	118,544	115,788	115,788	115,788
	Livestock	2006	1,614	1,614	1,614	1,614	1,614	1,614
		2011	1,614	1,614	1,614	1,614	1,614	1,614
	Manufacturing	2006	260,239	286,554	309,841	333,348	354,093	379,241
		2011	260,239	286,554	309,841	333,348	354,093	379,241
	Mining	2006	4,104	4,502	4,737	4,969	5,201	5,419
		2011	4,104	4,502	4,737	4,969	5,201	5,419
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**445,675**	**466,607**	**491,490**	**517,741**	**544,898**	**577,029**
		2011	**448,174**	**469,308**	**494,392**	**520,853**	**548,263**	**580,660**

Task 2 – Population and Water Demands

Water Demand – Chambers County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*31,375*	*37,328*	*42,867*	*47,667*	*52,535*	*57,521*
		2011	*34,282*	*40,786*	*46,838*	*52,083*	*57,402*	*62,850*
Water Demand (Ac-Ft/Yr)	Municipal	2006	4,625	5,438	6,180	6,824	7,506	8,249
		2011	**4,985**	**5,854**	**6,648**	**7,338**	**8,067**	**8,863**
	Irrigation	2006	117,777	117,777	117,777	117,777	117,777	117,777
		2011	117,777	117,777	117,777	117,777	117,777	117,777
	Livestock	2006	462	462	462	462	462	462
		2011	462	462	462	462	462	462
	Manufacturing	2006	11,802	12,959	13,987	15,011	15,932	17,122
		2011	11,802	12,959	13,987	15,011	15,932	17,122
	Mining	2006	37,422	40,532	42,427	44,286	46,130	47,742
		2011	37,422	40,532	42,427	44,286	46,130	47,742
	Steam Electric Power	2006	4,435	3,536	4,134	4,863	5,751	6,834
		2011	4,435	3,536	4,134	4,863	5,751	6,834
	TOTAL	**2006**	**176,523**	**180,704**	**184,967**	**189,223**	**193,558**	**198,186**
		2011	**176,883**	**181,120**	**185,435**	**189,737**	**194,119**	**198,800**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Fort Bend County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*490,072*	*630,624*	*802,486*	*979,196*	*1,210,945*	*1,475,761*
		2011	*545,883*	*715,275*	*893,875*	*1,090,710*	*1,348,851*	*1,643,825*
Water Demand (Ac-Ft/Yr)	Municipal	2006	89,579	111,680	138,770	165,904	202,470	245,404
		2011	**98,180**	**123,852**	**149,894**	**178,496**	**217,213**	**263,055**
	Irrigation	2006	53,455	53,455	53,455	53,455	53,455	53,455
		2011	53,455	53,455	53,455	53,455	53,455	53,455
	Livestock	2006	1,171	1,171	1,171	1,171	1,171	1,171
		2011	1,171	1,171	1,171	1,171	1,171	1,171
	Manufacturing	2006	6,863	7,199	7,468	7,685	7,829	7,410
		2011	6,863	7,199	7,468	7,685	7,829	7,410
	Mining	2006	3,010	3,070	3,105	3,138	3,169	3,196
		2011	3,010	3,070	3,105	3,138	3,169	3,196
	Steam Electric Power	2006	66,026	68,046	79,553	93,582	110,682	131,527
		2011	66,026	68,046	79,553	93,582	110,682	131,527
	TOTAL	**2006**	**220,104**	**244,621**	**283,522**	**324,935**	**378,776**	**442,163**
		2011	**228,705**	**256,793**	**294,646**	**337,527**	**393,519**	**459,814**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Galveston County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*268,714*	*284,731*	*294,218*	*298,057*	*300,915*	*302,774*
		2011	*268,714*	*284,731*	*294,218*	*298,057*	*300,915*	*302,774*
Water Demand (Ac-Ft/Yr)	Municipal	2006	46,090	47,390	47,818	47,487	47,393	47,641
		2011	46,090	47,390	47,818	47,487	47,393	47,641
	Irrigation	2006	10,342	10,342	10,342	10,342	10,342	10,342
		2011	10,342	10,342	10,342	10,342	10,342	10,342
	Livestock	2006	325	325	325	325	325	325
		2011	325	325	325	325	325	325
	Manufacturing	2006	41,005	44,330	47,046	49,692	51,967	55,491
		2011	41,005	44,330	47,046	49,692	51,967	55,491
	Mining	2006	265	279	286	293	300	307
		2011	265	279	286	293	300	307
	Steam Electric Power	2006	5,034	4,013	4,692	5,519	6,528	7,757
		2011	5,034	4,013	4,692	5,519	6,528	7,757
	TOTAL	**2006**	**103,061**	**106,679**	**110,509**	**113,658**	**116,855**	**121,863**
		2011	**103,061**	**106,679**	**110,509**	**113,658**	**116,855**	**121,863**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Harris County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*3,951,682*	*4,502,786*	*5,053,890*	*5,604,994*	*6,156,098*	*6,707,202*
		2011	*4,078,231*	*4,629,335*	*5,180,439*	*5,731,543*	*6,282,647*	*6,833,751*
Water Demand (Ac-Ft/Yr)	Municipal	2006	677,684	756,765	834,747	915,339	999,189	1,089,188
		2011	**706,813**	**785,055**	**863,902**	**942,276**	**1,024,102**	**1,112,393**
	Irrigation	2006	15,300	15,300	15,300	15,300	15,300	15,300
		2011	15,300	15,300	15,300	15,300	15,300	15,300
	Livestock	2006	1,133	1,133	1,133	1,133	1,133	1,133
		2011	1,133	1,133	1,133	1,133	1,133	1,133
	Manufacturing	2006	395,997	424,761	449,218	470,881	487,094	478,957
		2011	395,997	424,761	449,218	470,881	487,094	478,957
	Mining	2006	1,282	1,434	1,529	1,624	1,720	1,805
		2011	1,282	1,434	1,529	1,624	1,720	1,805
	Steam Electric Power	2006	7,728	23,962	28,015	32,955	38,977	46,317
		2011	7,728	23,962	28,015	32,955	38,977	46,317
	TOTAL	**2006**	**1,099,124**	**1,223,355**	**1,329,942**	**1,437,232**	**1,543,413**	**1,632,700**
		2011	**1,128,253**	**1,251,645**	**1,359,097**	**1,464,169**	**1,568,326**	**1,655,905**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Leon County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*18,231*	*21,137*	*22,863*	*22,971*	*22,809*	*23,028*
		2011	*18,231*	*21,137*	*22,863*	*22,971*	*22,809*	*23,028*
Water Demand (Ac-Ft/Yr)	Municipal	2006	2,122	2,364	2,475	2,441	2,400	2,422
		2011	**2,128**	**2,376**	**2,489**	**2,456**	**2,414**	**2,437**
	Irrigation	2006	542	542	542	542	542	542
		2011	542	542	542	542	542	542
	Livestock	2006	1,691	1,691	1,691	1,691	1,691	1,691
		2011	1,691	1,691	1,691	1,691	1,691	1,691
	Manufacturing	2006	714	842	967	1,093	1,207	1,313
		2011	714	842	967	1,093	1,207	1,313
	Mining	2006	1,517	1,464	1,435	1,409	1,384	1,364
		2011	1,517	1,464	1,435	1,409	1,384	1,364
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**6,586**	**6,903**	**7,110**	**7,176**	**7,224**	**7,332**
		2011	**6,592**	**6,915**	**7,124**	**7,191**	**7,238**	**7,347**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Liberty County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*81,930*	*94,898*	*107,335*	*119,519*	*132,875*	*147,845*
		2011	*81,930*	*94,898*	*107,335*	*119,519*	*132,875*	*147,845*
Water Demand (Ac-Ft/Yr)	Municipal	2006	10,283	11,370	12,401	13,455	14,670	16,176
		2011	**10,470**	**11,759**	**12,980**	**14,211**	**15,629**	**17,362**
	Irrigation	2006	82,901	82,901	82,901	82,901	82,901	82,901
		2011	82,901	82,901	82,901	82,901	82,901	82,901
	Livestock	2006	757	757	757	757	757	757
		2011	757	757	757	757	757	757
	Manufacturing	2006	393	465	537	611	678	736
		2011	393	465	537	611	678	736
	Mining	2006	8,730	8,753	8,766	8,778	8,790	8,800
		2011	8,730	8,753	8,766	8,778	8,790	8,800
	Steam Electric Power	2006	2,962	4,240	4,957	5,831	6,896	8,195
		2011	2,962	4,240	4,957	5,831	6,896	8,195
	TOTAL	**2006**	**106,026**	**108,486**	**110,319**	**112,333**	**114,692**	**117,565**
		2011	**106,213**	**108,875**	**110,898**	**113,089**	**115,651**	**118,751**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Madison County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*13,905*	*14,873*	*15,644*	*16,364*	*17,002*	*17,560*
		2011	*13,905*	*14,873*	*15,644*	*16,364*	*17,002*	*17,560*
Water Demand (Ac-Ft/Yr)	Municipal	2006	1,792	1,864	1,918	1,952	2,007	2,072
		2011	**1,793**	**1,867**	**1,921**	**1,954**	**2,010**	**2,075**
	Irrigation	2006	19	19	19	19	19	19
		2011	19	19	19	19	19	19
	Livestock	2006	750	750	750	750	750	750
		2011	750	750	750	750	750	750
	Manufacturing	2006	260	289	316	343	367	398
		2011	260	289	316	343	367	398
	Mining	2006	24	24	24	24	24	24
		2011	24	24	24	24	24	24
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**2,845**	**2,946**	**3,027**	**3,088**	**3,167**	**3,263**
		2011	**2,846**	**2,949**	**3,030**	**3,090**	**3,170**	**3,266**

Task 2 – Population and Water Demands

Water Demand – Montgomery County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*417,692*	*542,051*	*692,548*	*858,410*	*1,077,190*	*1,331,286*
		2011	*453,369*	*588,351*	*751,702*	*931,732*	*1,169,199*	*1,444,999*
Water Demand (Ac-Ft/Yr)	Municipal	2006	68,638	90,346	111,441	133,994	164,466	200,243
		2011	**74,350**	**98,430**	**121,683**	**146,476**	**179,791**	**218,933**
	Irrigation	2006	66	66	66	66	66	66
		2011	66	66	66	66	66	66
	Livestock	2006	510	510	510	510	510	510
		2011	510	510	510	510	510	510
	Manufacturing	2006	2,045	2,332	2,608	2,883	3,126	3,392
		2011	2,045	2,332	2,608	2,883	3,126	3,392
	Mining	2006	480	509	526	543	559	573
		2011	480	509	526	543	559	573
	Steam Electric Power	2006	5,046	8,537	9,981	11,741	13,886	16,502
		2011	5,046	8,537	9,981	11,741	13,886	16,502
	TOTAL	**2006**	**76,785**	**102,300**	**125,132**	**149,737**	**182,613**	**221,286**
		2011	**82,497**	**110,384**	**135,374**	**162,219**	**197,938**	**239,976**

Task 2 – Population and Water Demands

Water Demand – Polk County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*37,650*	*42,196*	*45,779*	*48,561*	*51,535*	*54,380*
		2011	*37,650*	*42,196*	*45,779*	*48,561*	*51,535*	*54,380*
Water Demand (Ac-Ft/Yr)	Municipal	2006	4,859	5,230	5,486	5,662	5,913	6,205
		2011	**5,062**	**5,632**	**6,046**	**6,335**	**6,693**	**7,088**
	Irrigation	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	Livestock	2006	134	134	134	134	134	134
		2011	134	134	134	134	134	134
	Manufacturing	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	Mining	2006	29	31	32	33	34	35
		2011	29	31	32	33	34	35
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**5,022**	**5,395**	**5,652**	**5,829**	**6,081**	**6,374**
		2011	**5,225**	**5,797**	**6,212**	**6,502**	**6,861**	**7,257**

Task 2 – Population and Water Demands

Water Demand – San Jacinto County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*27,443*	*32,541*	*36,617*	*39,159*	*40,630*	*41,299*
		2011	*27,443*	*32,541*	*36,617*	*39,159*	*40,630*	*41,299*
Water Demand (Ac-Ft/Yr)	Municipal	2006	3,161	3,622	3,972	4,158	4,262	4,329
		2011	**3,995**	**4,591**	**5,016**	**5,087**	**5,118**	**5,076**
	Irrigation	2006	667	667	667	667	667	667
		2011	667	667	667	667	667	667
	Livestock	2006	284	284	284	284	284	284
		2011	284	284	284	284	284	284
	Manufacturing	2006	48	52	56	60	63	68
		2011	48	52	56	60	63	68
	Mining	2006	30	29	28	27	26	26
		2011	30	29	28	27	26	26
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**4,190**	**4,654**	**5,007**	**5,196**	**5,302**	**5,374**
		2011	**5,024**	**5,623**	**6,051**	**6,125**	**6,158**	**6,121**

Task 2 – Population and Water Demands

Water Demand – Trinity County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*11,571*	*12,485*	*12,786*	*12,631*	*12,131*	*11,673*
		2011	*11,571*	*12,485*	*12,786*	*12,631*	*12,131*	*11,673*
Water Demand (Ac-Ft/Yr)	Municipal	2006	1,203	1,260	1,255	1,206	1,145	1,102
		2011	1,203	1,260	1,255	1,206	1,145	1,102
	Irrigation	2006	467	467	467	467	467	467
		2011	467	467	467	467	467	467
	Livestock	2006	211	211	211	211	211	211
		2011	211	211	211	211	211	211
	Manufacturing	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	Mining	2006	6	6	6	6	6	6
		2011	6	6	6	6	6	6
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**1,887**	**1,944**	**1,939**	**1,890**	**1,829**	**1,786**
		2011	**1,887**	**1,944**	**1,939**	**1,890**	**1,829**	**1,786**

Task 2 – Population and Water Demands

Water Demand – Walker County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*70,672*	*77,915*	*81,402*	*80,547*	*80,737*	*80,737*
		2011	*70,672*	*77,915*	*81,402*	*80,547*	*80,737*	*80,737*
Water Demand (Ac-Ft/Yr)	Municipal	2006	16,512	17,941	18,516	18,146	18,097	18,097
		2011	**21,879**	**24,244**	**25,074**	**23,575**	**22,971**	**22,251**
	Irrigation	2006	11	11	11	11	11	11
		2011	11	11	11	11	11	11
	Livestock	2006	632	632	632	632	632	632
		2011	632	632	632	632	632	632
	Manufacturing	2006	3,208	3,718	4,188	4,666	5,083	5,517
		2011	3,208	3,718	4,188	4,666	5,083	5,517
	Mining	2006	13	13	13	13	13	13
		2011	13	13	13	13	13	13
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**20,376**	**22,315**	**23,360**	**23,468**	**23,836**	**24,270**
		2011	**25,743**	**28,618**	**29,918**	**28,897**	**28,710**	**28,424**

Task 2 – Population and Water Demands

Water Demand – Waller County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*41,137*	*51,175*	*62,352*	*74,789*	*89,598*	*106,608*
		2011	*41,137*	*51,175*	*62,352*	*74,789*	*89,598*	*106,608*
Water Demand (Ac-Ft/Yr)	Municipal	2006	5,393	6,310	7,380	8,530	10,016	11,757
		2011	**5,713**	**7,003**	**8,469**	**10,084**	**12,093**	**14,454**
	Irrigation	2006	22,978	22,978	22,978	22,978	22,978	22,978
		2011	22,978	22,978	22,978	22,978	22,978	22,978
	Livestock	2006	939	939	939	939	939	939
		2011	939	939	939	939	939	939
	Manufacturing	2006	89	101	112	123	133	144
		2011	89	101	112	123	133	144
	Mining	2006	80	80	80	80	80	80
		2011	80	80	80	80	80	80
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**29,479**	**30,408**	**31,489**	**32,650**	**34,146**	**35,898**
		2011	**29,799**	**31,101**	**32,578**	**34,204**	**36,223**	**38,595**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Region H Total

	Type	RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*5,775,097*	*6,707,045*	*7,679,397*	*8,653,377*	*9,739,109*	*10,897,526*
		2011	*6,015,840*	*6,990,980*	*7,986,480*	*8,998,002*	*10,132,237*	*11,346,082*
Water Demand (Ac-Ft/Yr)	Municipal	2006	980,544	1,116,660	1,253,607	1,391,710	1,552,375	1,732,608
		2011	**1,033,968**	**1,177,494**	**1,317,878**	**1,457,306**	**1,621,483**	**1,806,775**
	Irrigation	2006	450,175	438,257	433,686	430,930	430,930	430,930
		2011	450,175	438,257	433,686	430,930	430,930	430,930
	Livestock	2006	12,228	12,228	12,228	12,228	12,228	12,228
		2011	12,228	12,228	12,228	12,228	12,228	12,228
	Manufacturing	2006	722,873	783,835	836,597	886,668	927,860	950,102
		2011	722,873	783,835	836,597	886,668	927,860	950,102
	Mining	2006	57,043	60,782	63,053	65,285	67,501	69,457
		2011	57,043	60,782	63,053	65,285	67,501	69,457
	Steam Electric Power	2006	91,231	112,334	131,332	154,491	182,720	217,132
		2011	91,231	112,334	131,332	154,491	182,720	217,132
	TOTAL	**2006**	**2,314,094**	**2,524,096**	**2,730,503**	**2,941,312**	**3,173,614**	**3,412,457**
		2011	**2,367,518**	**2,584,930**	**2,794,774**	**3,006,908**	**3,242,722**	**3,486,624**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Population and Water Demand Approval

- Approval of population and water demands by the RWPG is required before submittal for TWDB approval
- Projections were posted 14 days in advance of this meeting, per 31 TAC 357.5 (d) (2)
- Once approved, projections will be submitted to TWDB for consideration and approval, unless valid requests for revisions are made within next 14 days

Task 2 – Population and Water Demands

REGION H Water Planning Group

Population and Water Demand Approval

- A valid request for a demand revision will require a revised set of projections to be re-approved at a subsequent meeting following another posting of no less than 14 days
- Comments already received and are available for consideration
- Consultant team to evaluate additional revision requests, if any, and bring recommendations back to the RWPG at next meeting

Task 2 – Population and Water Demands

REGION H Water Planning Group

Requirements for Requesting a Revision

- Population Projections
  - Including, but not limited to the following justifications:
    - population estimates of the Texas State Data Center, or other credible sources, are greater than projected populations used in the 2007 state water plan for the year 2010;
    - population growth rates for a sub-county area as tabulated by the Texas SDC over the most recent five years is substantially greater than growth rates reported by the U.S. Census Bureau between 1990 and 2000;
    - cities have annexed additional land since the 2000 Census; or
    - water utilities have expanded their service areas since last updated by the Texas Commission on Environmental Quality.
- Per Capita Demand
  - if acceptable data sources indicate that a measured gallons per capita per day from years prior to 2000 *is more representative of drought of record conditions*

LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS - LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS

Task 2 – Population and Water Demands

REGION H Water Planning Group

Comments Received Since April 22nd

- Revised Population and Demand Projections
  - Fort Bend County MUD 23
  - City of Huntsville (Walker)
  - Northwest Park MUD (Harris)
  - City of Richmond (Fort Bend)
  - City of Shenandoah (Montgomery)
  - West Harris County Regional Water Authority (Harris/Fort Bend)
- General Comments
  - Lone Star Groundwater Conservation District

LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS - LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS

LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS - LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- Fort Bend County MUD 23
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	5,968	9,084	12,895	16,813	21,952	27,824
WUG	12,600	18,000	18,000	18,000	18,000	18,000

LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS - LATE AVAILABILITY - NOT INCLUDED IN MEETING MATERIALS

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- City of Huntsville
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	40,141	44,255	46,236	45,750	45,858	45,858
WUG	42,888	52,424	64,088	78,348	95,780	117,090

  Project significant growth
    - *Insufficient population in County-Other to reallocate*
    - *TWDB projections for Walker County already overestimating population, per SDC*
  - Submitted revised per capita demands
    - 175 gpcd proposed
    - 130 gpcd originally used by TWDB

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- Northwest Park MUD
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	10,099	12,271	13,522	14,760	15,990	17,216
WUG	24,031	29,106	29,992	29,992	29,992	29,992

  - Submitted revised per capita demands
    - 247 gpcd proposed
    - 112 gpcd originally used by TWDB

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- City of Richmond
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	15,891	19,713	24,386	29,191	35,492	42,692
WUG	12,084	13,243	14,388	15,426	16,465	17,505

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- City of Shenandoah
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	2,561	3,437	4,497	5,666	7,208	8,998
WUG	5,123	5,999	7,059	8,228	9,770	11,560

Task 2 – Population and Water Demands

REGION H Water Planning Group

Additional Requests for Revised Projections

- West Harris County Regional Water Authority
  - Submitted revised population projections

Projection	2010	2020	2030	2040	2050	2060
Draft	327,396	380,555	420,867	449,709	460,478	471,138
WUG	334,247	388,438	430,917	462,730	477,424	484,587

  - Submitted revised per capita demands
    - 169 gpcd proposed
    - 151 gpcd originally used by TWDB

Task 2 – Population and Water Demands

REGION H Water Planning Group

Letter from Lone Star GCD

- Recognizes that increased population in Montgomery will further accentuate the difficulty of maintaining annual target for groundwater pumpage
- Concern for WUGs that are approaching build-out
  - LSGCD has urged WUGs to participate in survey process
- Urges the use of the best available methodology for developing projections

Task 2 – Population and Water Demands

Public Comment

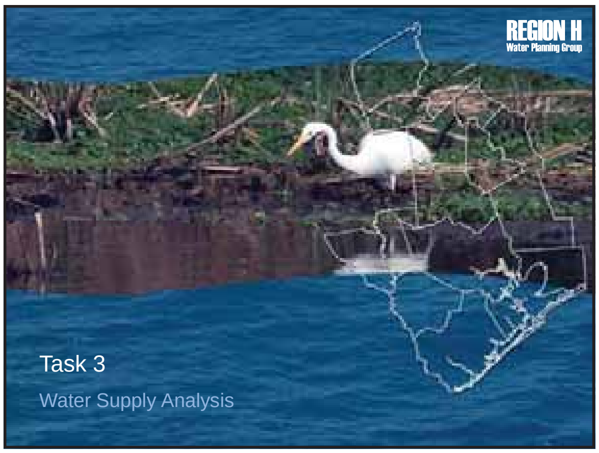
•*Item 5: Receive public comment on Item 4 (Population and water demand projections)*

Task 2 – Population and Water Demands

Approval of Population and Water Demands

•*Item 6: Consider and take action on approving the submittal of revised population and water demand projections to the Texas Water Development Board.*

- *Approval of Draft posted numbers*
- *Approval of comments received since posting*
- *Comments may be approved individually by group*
- *City of Huntsville may not be approved by TWDB. If not approved, the projections for Huntsville will reflect 2006 RWP projections.*



Task 3 – Water Supply Analysis

New Supply Sources

- Lake Houston Additional Yield
  - 28,200 acre-ft/year
  - 50% COH, 50% SJRA
  - Date Issued: 12/3/2008
  - 2006 Plan:
    - WMS ID: H15-HOUYLD10
    - Allocated to Katy, NHCRWA, Tomball
    - WMS Supply (acre-ft/year):

Year	2010	2020	2030	2040	2050	2060
Supply (acre-ft/year)	27,000	22,000	17,000	12,000	7,000	2,000

Task 3 – Water Supply Analysis

Firm Yield Determination

31 TAC 357.7 (a) (3) (C)

"The planning group shall use available Texas Commission on Environmental Quality water availability models for evaluating the adequacy of surface water supplies. The planning group shall assume full utilization of existing water rights and no return flows when using the water availability models and the group may use better site specific information upon written approval from the executive administrator. Until information is provided by the Texas Commission on Environmental Quality, regional water planning groups may use estimates of the projected amount of surface water that would be available from existing water rights during a drought of record. Once this information is available from the Texas Commission on Environmental Quality, the regional water planning group shall incorporate it in its next planning cycle unless better site-specific information is available."

Task 3 – Water Supply Analysis

Modified Firm Yield Determination

- March 31, 2009 TWDB approved request to use modified supply analyses.
- Trinity and Brazos yield analyses in both 2006 and 2011 Plans contain limited return flows as in Region C and G models
- Determination of firm yield for run-of-river rights
  - 2006 RWP – Minimum Annual Diversion
  - 2011 RWP – Monthly Basis
- Coordinate with major water rights holders to determine appropriate basis for determining yield

Task 3 – Water Supply Analysis

Region C Coordination – Upper Trinity Basin Return Flows

- Conference call held with Region C Consultants
  - Tom Gooch (Freese & Nichols, Inc)
- Draft Region C Water Conservation and Reuse Study (December 2008)
  - Potential reductions in return flows in region H for the 2011 plan.

Task 3 – Water Supply Analysis

Region G Coordination – Brazos G WAM Updates

- Met with BRA & HDR
  - Received Memo outlining 2011 Brazos G WAM assumptions from HDR
  - Received updated list of Region H contracts from BRA
- Return Flows
  - Slight reduction due to increased direct reuse
  - Specific requests from Bryan and College Station
- Region G Consultant (HDR) will transmit the updated Brazos G WAMs for Region H supply analysis

Task 4 – WMS Selection

Planning Group is required to document how WMS selection will be performed, per 31 TAC 357.5 (e) (4)

"provide specific recommendations of water management strategies based upon identification, analysis, and comparison of all water management strategies the regional water planning group determines to be potentially feasible so that the cost effective water management strategies which are environmentally sensitive are considered and adopted unless the regional water planning group demonstrates that adoption of such strategies is not appropriate. To determine cost-effectiveness, the regional water planning groups will use the process described in §357.7(a)(8)(A)(i) of this title (relating to Regional Water Plan Development) and, to determine environmental sensitivity, the regional water planning groups shall use the process described in §357.7(a)(8)(A)(ii) of this title. ***Before a regional water planning group begins the process of identifying potentially feasible water management strategies, it shall document the process by which it will list all possible water management strategies and identify the water management strategies that are potentially feasible for meeting a need in the region.*** *Once this process is identified, the regional water planning group shall present it to the public for comment at the public meeting required by §357.12(a)(1) of this title (relating to Notice and Public Participation);"*

Task 4 – WMS Selection

General Process for WMS Selection

- Shortage analysis
  - Performed under Task 3
- Application of General WMS
  - Increased groundwater use
  - Increase existing contracts
  - Conservation

Task 4 – WMS Selection

General Process for WMS Selection

- Identification/Selection of WMS to Add New Water Supplies
  - Development of matrix to evaluate:
    - Suitability of strategy
    - Environmental impacts
    - Cost

Task 4 – WMS Selection

General WMS

- Represent strategies that can be applied without the development of new water supplies.
- Can be applied at the WUG level and do not require WWP sponsorship.
- Many WUG shortages can be met by increasing surface water contracts if WWP surplus exists.
  - Applied to 43 WUG units in 2006 RWP

Task 4 – WMS Selection

General WMS

- It is required that conservation be considered
  - Applied to 133 WUG units in 2006 RWP
- New wells where groundwater is available
  - Applied to 280 WUG units in the 2006 RWP

Task 4 – WMS Selection

Existing 2006 WMS

- Evaluate validity of existing strategies
  - WUG sponsorship and agreement of WMS
  - Technical feasibility
  - New information from WUG and/or water providers
  - Outreach to better achieve consistency with plan
- Already evaluated in decision matrix last round

Task 4 – WMS Selection

WMS Selection Methodology – New Projects

CATEGORY	RATING CRITERIA		
	-1	0	1
Cost	>$200/ac-ft	<$200/ac-ft	<$100/ac-ft
Yield	Size is too small or too large for need	Size is flexible or meets needs	Size can be adjusted to optimum
Location	IBT required, long distance or outside Region H.	No IBT required. Conveyance required.	No IBT required. Relatively near demand.
Water Quality	Quality of supply is reduced.	No known water quality issues.	Existing water quality problems are reduced.
Environmental Land & Habitat	Significant environmental issues and opposition.	Environmental impacts can be mitigated. Limited concerns.	Limited or no known impacts.
Local Preference	No local support. Significant opposition.	Some local support. Limited opposition.	Widespread local support. Multi-use benefits likely.
Institutional Constraints / Risk of Implementability	Permits opposed. Significant property required.	Permits expected with minimal problems. Property available.	Permits issued. Facilities or land owned. Water available.
Impacts on Environmental Flows	Reduces instream or B&E flows.	No impact.	Increases instream or B&E flows.
Impacts on Other Management Strategies	Negative impact.	No impact.	Positive impact.

Task 4 – WMS Selection

Alternative Strategies

- Will be identified when:
  - Choice in long-term supply solutions is uncertain
  - WMS are comparable in qualitative value
  - Called for in SOW
- SOW includes a subtask to identify alternative strategies

Task 4 – WMS Selection

Alternative Strategies

- Strategies for selection include, but are not limited to:
  - Storage to enhance yields from ROR supplies
  - Aquifer storage and recovery (ASR)
  - Brackish water desalination
- Alternative WMS to be selected using same strategy matrix used for new strategies

Task 4 – WMS Selection

Approval of WMS Selection Strategy

•*Item 9: Consider and take action approving the WMS selection approach described under Item 8*

Task 6 – Water Conservation and Drought Management

Water Conservation Survey

- Mailed surveys to 232 WUGs
- Identify:
  - Conservation measures implemented
  - Identify measures considered for future implementation
  - Startup and Operating Costs associated with each measure
  - Estimated Water Savings
- Information gained from surveys will be used to update conservation strategies.
- Request responses to survey by May 15th

Appendix 10D

Public Hearing Materials
July 1, 2009

This Page Intentionally
Left Blank

Contents – July 1, 2009 Public Meeting

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-1111 Facsimile 936-588-3043

Notice of Public Meeting and Opportunity to Comment on Proposed Population and Water Demand Projections to Update the Region H Regional Water Plan

June 10, 2009

On May 6, 2009, the 15-county Region H Water Planning Group (RHWPG) adopted projected population and water demands for most Water User Groups (WUGs) in the region. For a few WUGs, comments and documentation were submitted that required revisions of the projections for those WUGs. These revisions have been made and will be incorporated into the regional projections for discussion and approval at the regular meeting of the RHWPG to be held on July 1, 2009. Both the proposed revisions and the projections adopted on May 6, are available for review at the RHWPG website www.regionhwater.org.

Projected population and water demands for WUGs in the Region will be submitted to the Texas Water Development Board (TWDB) for approval, and will be used in preparing an updated Regional Water Plan which will be submitted to the Texas Water Development Board (TWDB) in 2011. The TWDB will consolidate the reports from the 16 Regional Water Planning Areas and report to the Texas Legislature not later than January 2012.

In accordance with rules of the Texas Water Development Board, the RHWPG will receive comments from the public during its regular meeting to be held at 10:00 a.m., July 1, 2009, at the SJRA offices, 1577 Damsite Road, Conroe, Texas on the proposed population and water demand projections for those WUGs not previously approved. Action on the proposed projections is anticipated at that meeting. Comments may also be submitted by mail to the SJRA at the address below. Comments and documentation of requested changes must be received by July 16, 2009.

Reed Eichelberger, PE, General Manager
San Jacinto River Authority
P.O. Box 329
Conroe, Texas 77305-0329

The current (2006) Region H Water Plan and draft materials for the 2011 Plan are available on the RHWPG website at www.regionhwater.org. The 2006 Plan is also available on the TWDB website at www.twdb.state.tx.us.

For further information, please contact Glenda Callaway, 713-520-9031.

2011 Regional Water Plan Schedule

Date	Event	Items Due
02/04/09	RWPG Meeting	No Deliverables
05/06/09	RWPG Meeting	Population and Water Demand Projections for Consideration by RWPG
07/01/09	**RWPG Meeting**	**Draft Chapters 2 and 3; Proposed Recommendations and Strategies for Consideration by RWPG**
09/02/09	RWPG Meeting	Draft Chapters 4, 5, and 8
10/07/09	RWPG Meeting	Draft Chapters 1, 6, 7, and 9
12/02/09	RWPG Meeting	Draft Initially Prepared Plan
03/01/10	Due Date	Draft Final Initially Prepared Plan
09/01/10	Due Date	Regional Water Plan

Focus for Today's Meeting

- 1st Biennium Studies
  - Review TWDB comments to Draft reports
- Task 2 – Population and Water Demands
  - New proposed demands for Huntsville, Richmond, and Fort Bend County Steam-Electric
  - Draft Chapter 2
- Task 3 – Water Supply Analysis
  - Review firm yield analysis for water supplies
  - Review resource allocation and shortage analysis
  - Draft Chapter 3
- Task 4 – Water Management Strategy Selection
  - Discuss WMS considered in 2006 RWP.

1st Biennium Special Studies

Environmental Flows Study

- Additional text to describe Frequency of Target Attainment (FTA) in Executive Summary
- Clarification of Instream Flows Conclusion 3
  - Added data regarding the period of flow below Lyons
  - Criteria used were not clear indicators of degradation at locations examined
  - Detailed instream flow analysis not included in scope
- Clarification of assessing Max H attainment
  - In reality flows can be too high as well
  - Optimal conditions when all 12 months in a year are at or near monthly targets
- Minor editorial changes

1st Biennium Special Studies

Drought Management Study

- Clarification on non-seasonal (indoor) water use assumption.
  - Assumption does not consider variations in city size and socioeconomic conditions
  - Assumption does not include influence of commercial and institutional water use.
  - Included text to clarify that figure was for illustration purposes only
- Explanation of "months of remaining supply"
  - Based on formula below, not directly from WAM output
  - Projected Demand / Minimum Reservoir Storage
- Clarification of Conclusion 6
  - Supply is made available on an interruptible basis
  - Not necessarily available every year or every month during the drought of record
- Minor editorial changes

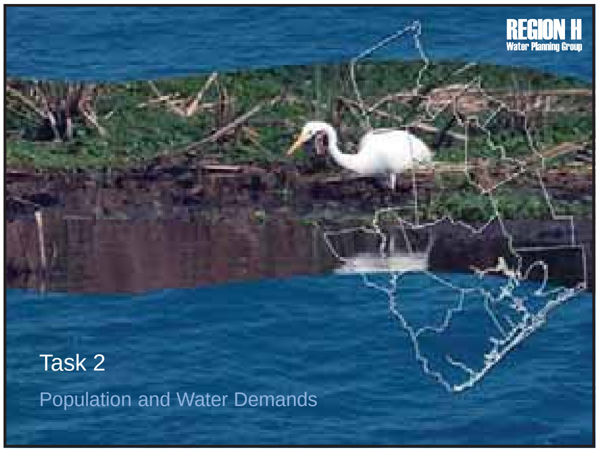
1st Biennium Special Studies

Interruptible Supply Study

- Added text to clarify that TWDB guidelines allow the use of “safe yield” if approved by the Executive Administrator.
- Clarification of monthly diversion test
  - “does not consider the magnitude of monthly diversions”
  - Monthly test only tests if a monthly diversion target is met
  - Does not consider the annual shortage
- Added text to clarify that over appropriation when considering drought of record conditions is indicated by the presence of:
  - large interruptible supplies
  - firm yields significantly lower than permitted diversions
- Included permitted amounts for water rights in the Colorado-Brazos Basin
  - Clarified that the “firm yield” is equal to the amount contracted to entities in Region H
- Minor editorial changes

1st Biennium Special Studies

- ***Item 5:** Consider and take action on approving the Environmental Flows Study Final Report for submittal to the Texas Water Development Board (TWDB) on or before July 31, 2009.*
- ***Item 7:** Consider and take action on approving the Drought Management Study Final Report for submittal to the Texas Water Development Board (TWDB) on or before July 31, 2009.*
- ***Item 9:** Consider and take action on approving the Interruptible Supply Study Final Report for submittal to the Texas Water Development Board (TWDB) on or before July 31, 2009.*



Task 2 – Population and Water Demands

Items for Consideration

- General Comments
  - Brandt Mannchen
  - City of Sugar Land
- Revised Population and Demand Projections
  - City of Huntsville (Walker)
  - City of Richmond (Fort Bend)
  - North Fort Bend Water Authority
  - Steam-Electric Demands (Fort Bend)
- Approval of Population and Water Demands
- Approval of Draft Chapter 2

Task 2 – Population and Water Demands

General Comments – Brandt Mannchen

- Methods used for showing the population and water demands for 2011 RWP
  - Addressed on Region H website with supporting material
- Power generation demands growing in direct proportion to population growth
  - RWPG agreed to adopt 2006 projections
- Sustainable growth of Region H
- Impacts of socio-economic factors on population growth

Task 2 – Population and Water Demands

General Comments – City of Sugar Land

- Concerns over methods used in showing City annexation
  - Requested that areas proposed to be annexed into the City, such as MUDs, be shown as having a zero population and water demand projections in the decades following annexation while the City’s projections would increase accordingly.
- Will be working with Sugar Land and other WUGs to account for future plans, including annexation.

Task 2 – Population and Water Demands

REGION H Water Planning Group

City of Huntsville

- *Outstanding Issues*
  - *Insufficient population in County-Other to reallocate*
  - *SDC estimates for Walker County below 2006 RWP projection*
- Prepared revised projections
  - Retain City projections for near-term growth
  - Adopt growth from 2006 RWP for 2030 and beyond
  - Revised per capita based on service area (160 gpcd)

Huntsville Population						
Projection	2010	2020	2030	2040	2050	2060
Draft	40,141	44,255	46,236	45,750	45,858	45,858
WUG	42,888	52,424	54,405	54,405	54,405	54,405

Task 2 – Population and Water Demands

REGION H Water Planning Group

City of Richmond

- *Outstanding Issues*
  - *WUG projections below SDC 2007 estimate*
- Prepared revised projections
  - Census growth rate from 2000-2007 is 2%, vs. 4.2% from SDC
  - Used Census growth rate for initial projection and adjusted based on changes in TWDB recommended population growth trend

Richmond Population						
Projection	2010	2020	2030	2040	2050	2060
Draft	15,891	19,713	24,386	29,191	35,492	42,692
WUG	13,493	14,212	17,257	20,334	25,149	30,295

Task 2 – Population and Water Demands

REGION H Water Planning Group

North Fort Bend Water Authority

- *Outstanding Issues*
  - *Revised per capita demand for 210 gpcd had not yet been applied to demands*
- Worked with TWDB to have the 210 gpcd considered and applied as a base per capita demand

NFBWA Water Demand (Ac-Ft/Yr)						
Projection	2010	2020	2030	2040	2050	2060
Draft	1,636	1,597	1,537	1,458	1,361	1,254
WUG	1,636	1,566	1,557	1,626	1,660	1,640

Task 2 – Population and Water Demands

REGION H Water Planning Group

Fort Bend County Steam-Electric

- *Outstanding Issues*
  - *Projections seem high for current operation of W.A. Parish Plant*
- Reviewed and confirmed current demands
  - Demands represent worst-case scenario for diversions

Fort Bend County Steam-Electric Demands (Ac-Ft/Yr)						
Projection	2010	2020	2030	2040	2050	2060
Draft	66,026	68,046	79,553	93,582	110,682	131,527

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Fort Bend County

	Type	RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*490,072*	*630,624*	*802,486*	*979,196*	*1,210,945*	*1,475,761*
		2011	*545,883*	*715,275*	*893,875*	*1,090,710*	*1,348,851*	*1,643,825*
Water Demand (Ac-Ft/Yr)	Municipal	2006	89,579	111,680	138,770	165,904	202,470	245,404
		2011	**109,869**	**143,023**	**174,552**	**208,691**	**251,533**	**300,689**
	Irrigation	2006	53,455	53,455	53,455	53,455	53,455	53,455
		2011	53,455	53,455	53,455	53,455	53,455	53,455
	Livestock	2006	1,171	1,171	1,171	1,171	1,171	1,171
		2011	1,171	1,171	1,171	1,171	1,171	1,171
	Manufacturing	2006	6,863	7,199	7,468	7,685	7,829	7,410
		2011	6,863	7,199	7,468	7,685	7,829	7,410
	Mining	2006	3,010	3,070	3,105	3,138	3,169	3,196
		2011	3,010	3,070	3,105	3,138	3,169	3,196
	Steam Electric Power	2006	66,026	68,046	79,553	93,582	110,682	131,527
		2011	66,026	68,046	79,553	93,582	110,682	131,527
	TOTAL	**2006**	**220,104**	**244,621**	**283,522**	**324,935**	**378,776**	**442,163**
		2011	**240,394**	**275,964**	**319,304**	**367,722**	**427,839**	**497,448**

Task 2 – Population and Water Demands

REGION H Water Planning Group

Water Demand – Harris County

	Type	RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*3,951,682*	*4,502,786*	*5,053,890*	*5,604,994*	*6,156,098*	*6,707,202*
		2011	*4,078,231*	*4,629,335*	*5,180,439*	*5,731,543*	*6,282,647*	*6,833,751*
Water Demand (Ac-Ft/Yr)	Municipal	2006	677,684	756,765	834,747	915,339	999,189	1,089,188
		2011	**709,300**	**789,397**	**868,320**	**948,412**	**1,030,899**	**1,119,593**
	Irrigation	2006	15,300	15,300	15,300	15,300	15,300	15,300
		2011	15,300	15,300	15,300	15,300	15,300	15,300
	Livestock	2006	1,133	1,133	1,133	1,133	1,133	1,133
		2011	1,133	1,133	1,133	1,133	1,133	1,133
	Manufacturing	2006	395,997	424,761	449,218	470,881	487,094	478,957
		2011	395,997	424,761	449,218	470,881	487,094	478,957
	Mining	2006	1,282	1,434	1,529	1,624	1,720	1,805
		2011	1,282	1,434	1,529	1,624	1,720	1,805
	Steam Electric Power	2006	7,728	23,962	28,015	32,955	38,977	46,317
		2011	7,728	23,962	28,015	32,955	38,977	46,317
	TOTAL	**2006**	**1,099,124**	**1,223,355**	**1,329,942**	**1,437,232**	**1,543,413**	**1,632,700**
		2011	**1,130,740**	**1,255,987**	**1,363,515**	**1,470,305**	**1,575,123**	**1,663,105**

Task 2 – Population and Water Demands

Water Demand – Walker County

Type		RWP	2010	2020	2030	2040	2050	2060
Municipal Population		*2006*	*70,672*	*77,915*	*81,402*	*80,547*	*80,737*	*80,737*
		2011	*70,672*	*77,915*	*81,402*	*80,547*	*80,737*	*80,737*
Water Demand (Ac-Ft/Yr)	Municipal	2006	16,512	17,941	18,516	18,146	18,097	18,097
		2011	**16,920**	**16,607**	**17,244**	**16,240**	**16,042**	**15,786**
	Irrigation	2006	11	11	11	11	11	11
		2011	11	11	11	11	11	11
	Livestock	2006	632	632	632	632	632	632
		2011	632	632	632	632	632	632
	Manufacturing	2006	3,208	3,718	4,188	4,666	5,083	5,517
		2011	3,208	3,718	4,188	4,666	5,083	5,517
	Mining	2006	13	13	13	13	13	13
		2011	13	13	13	13	13	13
	Steam Electric Power	2006	0	0	0	0	0	0
		2011	0	0	0	0	0	0
	TOTAL	**2006**	**20,376**	**22,315**	**23,360**	**23,468**	**23,836**	**24,270**
		2011	**20,784**	**20,981**	**22,088**	**21,562**	**21,781**	**21,959**

Task 2 – Population and Water Demands

Population and Water Demand Approval

- Approval of population and water demands by the RWPG is required before submittal for TWDB approval
- Projections were posted 14 days in advance of this meeting, per 31 TAC 357.5 (d) (2)
- Once approved, projections will be submitted to TWDB for consideration and approval, unless valid requests for revisions are made within next 14 days
- A valid request for a demand revision will require a revised set of projections to be re-approved at a subsequent meeting following another posting of no less than 14 days

Task 2 – Population and Water Demands

Public Comment

- ***Item 11:*** *Receive public comment on Item 10 (Population and water demand projections)*

Task 2 – Population and Water Demands

Approval of Population and Water Demands

- ***Item 12:*** *Consider and take action on approving the submittal of revised population and water demand projections to the Texas Water Development Board.*
  - *Approval of Draft posted numbers, City of Huntsville and City of Richmond. If not approved, the projections for Huntsville and Richmond will reflect 2006 RWP projections.*
  - *Approval of comments received since posting*
  - *Comments may be approved individually by group*

Task 2 – Population and Water Demands

Draft Chapter 2

- Prepared to summarize the development of population and water demand projections
- Informal approval to move forward from these tasks
  - Will be reviewed again in IPP
- Posted to Region H Website on June 17th
- ***Item 13:*** *Consider and take action on approving the Draft Chapter 2 made available on the Region H website prior to the meeting*

Task 3 – Water Supply Analysis

REGION H Water Planning Group

Task 3 Items

- Groundwater Supply
- Surface Water Supply
- Resource Allocation and Shortage Analysis
- Development of Chapter 3

Task 3 – Groundwater Supply

REGION H Water Planning Group

Groundwater Supply

- Major Aquifers
  - Gulf Coast
  - Carrizo-Wilcox
- Minor Aquifers
  - Queen City
  - Sparta
  - Yegua-Jackson
  - Brazos River Alluvium

REGION H Water Planning Group

Task 3 – Groundwater Supply

REGION H Water Planning Group

- Contacted Groundwater Conservation Districts and Subsidence Districts in Region H
- Reviewed Groundwater Management Areas Information (GMA-12 and GMA-14)
- Reviewed Groundwater Availability Models (GAMs) Utilization
- Obtained Current Estimates of Groundwater Availability Consistent with GMA and Groundwater or Subsidence District Efforts
- Updated the Previous Estimates of Groundwater Availability

Task 3 – Groundwater Supply

REGION H Water Planning Group

County	Source	2000	2010	2020	2030 (acre-feet)	2040	2050	2060
Austin	Brazos River Alluvium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Brazoria	Aquifer (Undifferentiated)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chambers	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fort Bend	Brazos River Alluvium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Galveston	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Harris	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Leon	Carrizo-Wilcox Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Queen City Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sparta Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Liberty	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

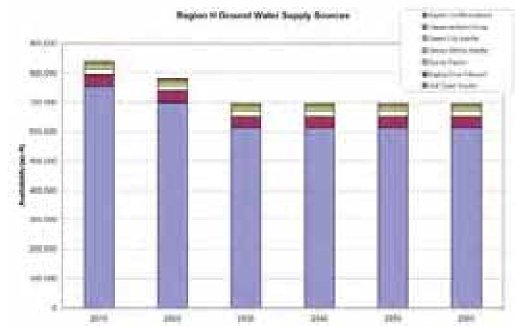
Task 3 – Groundwater Supply

REGION H Water Planning Group

County	Source	2000	2010	2020	2030 (acre-feet)	2040	2050	2060
Madison	Aquifer (Undifferentiated)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Carrizo-Wilcox Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Queen City Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sparta Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Montgomery	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Polk	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
San Jacinto	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trinity	Aquifer (Undifferentiated)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Carrizo-Wilcox Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sparta Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Walker	Aquifer (Undifferentiated)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Carrizo-Wilcox Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Queen City Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sparta Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Yegua-Jackson Group	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Waller	Brazos River Alluvium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Gulf Coast Aquifer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	County Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Task 3 – Groundwater Supply

REGION H Water Planning Group



Task 3 – Groundwater Supply

REGION H Water Planning Group

Groundwater Supply Summary

- Gulf Coast Aquifer Provides Vast Majority of Water
- Approximately 70 Percent of Groundwater Availability Is In The Six Most Coastward Counties
- Carrizo – Wilcox and Sparta Aquifers Are Important Water Resources in Leon and Madison Counties
- Groundwater Continues to Provide a Sustainable and Locally Available Water Supply

Task 3 – Surface Water Supply

REGION H Water Planning Group

Update of Surface Water Supplies

- Pre Modeling
  - Coordination with Region C (Freese & Nichols)
  - Coordination with HDR (Region G)
- Post Modeling
  - Presented Modeling Results to WWPs:
  - COH, SJRA, TRA, GCWA & CLCND
- Major Basins:
  - Trinity, San Jacinto, Brazos & Neches River Basins
  - Trinity-San Jacinto, Neches-Trinity, Brazos-Colorado & San Jacinto-Brazos Coastal Basin

Task 3 – Surface Water Supply

REGION H Water Planning Group

Update of Surface Water Supplies

- Firm Yield Determination (Task 3.13)
  - Evaluation of surface water rights on a monthly basis for each planning decade (2010 to 2060)
- Methodology
  - Perform Monthly Firm Yield Analysis for all basins
  - Perform Minimum Annual Diversion Analysis
    - Similar Methodology as 2006 Plan
  - Compare Results with 2006 Availability
- WAM Models
  - TCEQ WAM Run 3 (Full Permitted Diversion, No Return Flows)
  - Brazos and Trinity Basin Models assume limited return flows

Task 3 – Surface Water Supply

REGION H Water Planning Group

SAN JACINTO BASIN

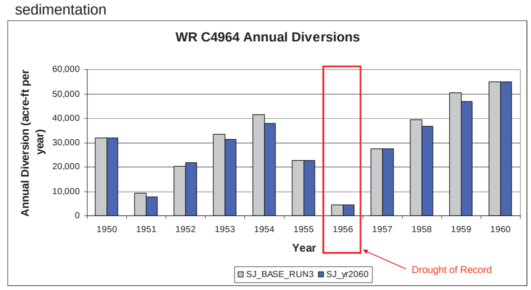
Source	Owner	2006 Plan (afy)	2011 Analysis (afy)	Change (afy)
10030	COH & SJRA - Lake Conroe	74,300	74,300[1]	0
3461004964	SJRA – RoR	55,000	55,000[2]	0
10060	COH - Lake Houston	168,000	168,000[2]	0
10060	COH & SJRA - Lake Houston Additional Yield	2,000	10,000[1]	8,000
3510170	SJRA - Indirect Reuse	14,944	14,944	0
TOTAL		314,244	322,244	8,000

1) Table shows 2060 Availability
2) Based on agreed coordination between City of Houston and SJRA

Source: 3461004964 – SJRA RoR

REGION H Water Planning Group

- Note: WAM Run3 does not firm up diversions with releases from Lake Houston
- SJ_yr2060 model assumes 2060 reservoir capacity due to projected sedimentation



Source: 3461004964 – SJRA RoR

REGION H Water Planning Group

Supply Agreement for Lower San Jacinto Rights

- Held Meetings with City of Houston & SJRA
  - June, 2009
  - Discussed WR reliability and options for firming up both SJRA ROR and COH water rights in Lake Houston
- Recommended WR Availability
  - Recommend 55,000 acre-ft per year for SJRA ROR and 168,000 acre-feet per year for COH-Lake Houston
  - Based on agreement between COH and SJRA and available options for firming up rights
  - No change from 2006 Plan

Source: 10060 – Lake Houston Add. Yield

REGION H Water Planning Group

- Permitted in Dec, 2008 by COH and SJRA
- Permitted Diversion: 28,200 acre-ft per year
- 2006 Plan: recommended 2,000 acre-ft per year (2060)
- 2011 Plan: **10,000** acre-ft per year (2060)

2011 Analysis

Decade	2010	2020	2030	2040	2050	2060
Minimum Annual Diversion	-	-	-	-	-	-
Firm Yield	17,500	16,000	14,500	13,000	11,500	10,000
Recommended Availability	17,500	16,000	14,500	13,000	11,500	10,000

Task 3 – Surface Water Supply

REGION H Water Planning Group

TRINITY – SAN JACINTO BASIN

- TCEQ WAM Run 3 (full permitted use, no return flows)
- No significant change in total basin supply

Source	Owner	2006 Plan (afy)	2011 Analysis (afy)	Change (afy)
60903909	PVT IRR	685	769	84
60903918	PVT IRR	1,084	976	-108
60903922	PVT IRR	628	661	33
60903923	PVT IRR	626	694	68
60903924	PVT IRR	1,209	1,213	4
60903926	MFR	30,000	30,000	0
TOTAL		**34,232**	**34,313**	**81**

Task 3 – Surface Water Supply

REGION H Water Planning Group

TRINITY BASIN

Source	Owner	2006 Plan	2011 Analysis	Change
3410805271A	DEVERS	2,500	2,500	0
3410805271B	SJRA	56,000	56,000	0
084H0[1]	**TRA - LIVINGSTON-WALLISVILLE**	**403,200**	**403,200**	**0**
084H0[1]	**COH - LIVINGSTON-WALLISVILLE**	**940,800**	**940,800**	**0**
3460804261	COH - OLD RIVER	26,510	26,510	0
3460804277	COH	33,000	33,000	0
3460804279B	CLCND	79,020	76,520	2,500
3460804279	SJRA	30,000	30,000	0
TOTAL		**1,568,530**	**1,566,030**	**2,500**

1) 2060 Firm Yield shown, Trinity Firm Yield Analysis was performed for each decade.

Task 3 – Surface Water Supply

REGION H Water Planning Group

Lake Livingston Firm Yield

- Desktop Analysis
  - Review 2006 Region C Plan
  - Identify WMSs That May Reduce Return Flows
  - Estimate Annual Return Flow Available to Region H
- Firm Yield Analysis
  - Update WAM with Projected Return Flows
  - Determine Firm Yield of Lake Livingston
  - Determine Necessary Level of Return Flows
  - Evaluate Excess or Shortfall of Return Flows

Task 3 – Surface Water Supply

REGION H Water Planning Group

Desktop Analysis of Projected Return Flows

- Region C Reports:
  - 2006 Region C Water Plan
  - 2008 Region C Water Conservation and Reuse Study
    - Updated with information collected from WW dischargers
    - More consumptive use of existing supplies
    - Resulted in a lower return flow factor (RF)
- Comparison of Estimated Return Flows
  - Minimum Return Flow of 253,055 acre-ft per year in 2030

Estimated Net Upper Basin Return Flows (acre-ft/year)

	RF	2010	2020	2030	2040	2050	2060
2006 Net Return Flows	69%	650,280	579,730	583,825	693,744	815,218	992,905
2008 Net Return Flows	51%	415,185	282,886	253,055	333,844	430,092	572,491
Reduction		235,095	296,844	330,770	359,900	385,126	420,414

Task 3 – Surface Water Supply

REGION H Water Planning Group

Upper Basin WAM Models

- Coordination with Region C
  - March, 2009
  - Freese & Nichols
  - Received Trinity WAMs to estimate projected Net Upper Basin Return Flows March & April, 2009.
- Upper Basin Models
  - Future condition model runs
  - Based on TCEQ WAM RUN 8 models
  - Upper basin updated with projected diversions, return flows and reuse diversions
  - Recorded model output at Oakwood USGS gage

Task 3 – Surface Water Supply

REGION H Water Planning Group

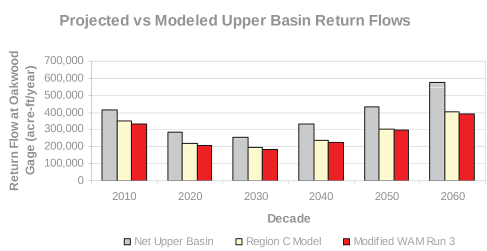
Lake Livingston Firm Yield

- Updated WAM Run3
  - Similar methodology as Region C WAMs
    - TCEQ WAM Run 3 (full permitted diversions, no return flows)
    - Added projected return flows and reuse diversions
    - Updated WAMs with Livingston Storage Capacity for 2000, 2030 & 2060
- Results
  - Lake Livingston Storage Tables
  - Regulated Flow at Oakwood Gage
    - Compared to Region C WAMs

Task 3 – Surface Water Supply

REGION H Water Planning Group

Return Flow at Oakwood Gage (CP 8TROA)



Task 3 – Surface Water Supply

REGION H Water Planning Group

Lake Livingston Firm Yield – Modified WAM RUN3

Lake Livingston Firm Yield (acre-ft/year)

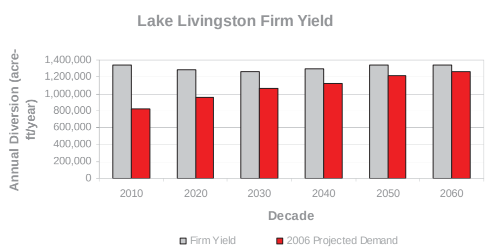
Return Flows	2010	2020	2030	2040	2050	2060
Firm Yield	1,344,000	1,289,000	1,265,000	1,294,000	1,344,000	1,344,000
Reduction in Firm Yield	0	-55,000	-79,000	-50,000	0	0

Task 3 – Surface Water Supply

REGION H Water Planning Group

Comparison to 2006 RWP Projected Demands

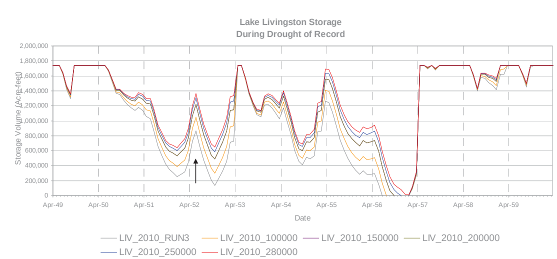
- Surplus supplies available in Lake Livingston in 2020, 2030 and 2040



Task 3 – Surface Water Supply

REGION H Water Planning Group

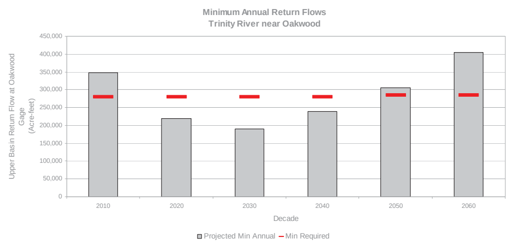
- Necessary Level of Return Flows – Iterative Approach



Task 3 – Surface Water Supply

REGION H Water Planning Group

- Excess or Shortfall?



Task 3 – Surface Water Supply

REGION H Water Planning Group

NECHES - TRINITY BASIN

Source	Owner	2006 Plan	2011 Analysis	Change
3410704290	PVT IRR	1,069	1,037	-32
3410704291	PVT IRR	1,078	1,078	-1
3410705016	PVT IRR	901	1,012	111
3460704287	PVT IRR	2,528	2,528	0
3460704293	PVT IRR	1,626	1,626	0
3460704294	PVT IRR	573	573	0
3410704295	PVT IRR	1,205	1,199	-6
3410704299	PVT IRR	1,173	1,173	-1
3460704300	PVT IRR	805	805	0
3460704304	MFR	2663	2,663	0
3460704304B	PVT IRR	1997	1,997	0
3410704306	PVT IRR	1,818	1,818	-1
3460704308	PVT IRR	771	771	0
3460704309	PVT IRR	711	711	0
3410704311	PVT IRR	2,093	2,072	-21
3460704312	PVT IRR	691	691	0
TOTAL		21,702	21,753	50

Task 3 – Surface Water Supply

REGION H Water Planning Group

BRAZOS BASIN

Source	Owner	2006 Plan (afy)	2011 Analysis (afy)	Change (afy)
120E0[1]	BRA	138,913	155,030	16,117
3461205168	**GCWA**	**98,805**	**97,225**	**-1,580**
3461205171	**GCWA**	**72,388**	**64,159**	**-8,229**
3461205320	Rich Irr. / HL&P	29,920	29,920	0
3461205322B	**GCWA**	**63,812**	**68,402**	**4,590**
3461205325	HL&P	34,300	34,300	0
3461205328B	DOW	148,052	137,475	-10,577
3461205366	BWA	23,017	16,492	-6,525
3461205492	Eagle Nest Lake	1,800	1,800	0
TOTAL		611,007	604,803	-6,204

1) Existing Contracts from BRA System

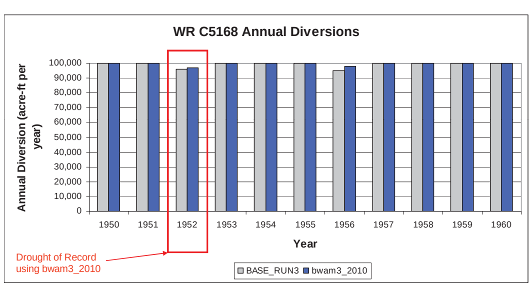
Task 3 – Surface Water Supply

REGION H Water Planning Group

- Coordination with Region G
- Received Region G WAMs in May from HDR
  - bwam3_2010
  - bwam3_2060
- Following Results
  - Base Line: TCEQ WAM RUN3 (BASE_RUN3)
  - Projected: Brazos WAM (bwam3_2010)

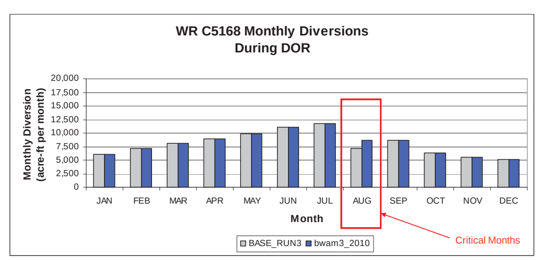
Source: 3461205168 – GCWA RoR

REGION H Water Planning Group



Source: 3461205168 – GCWA - RoR

REGION H Water Planning Group



Source: 3461205168 - Summary

REGION H Water Planning Group

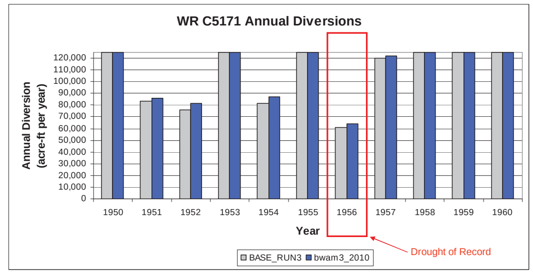
- Permitted Diversion: 99,932 acre-ft per year
- 2006 Plan Recommended: 98,805 acre-ft per year
- 2011 Plan: 97,255 acre-ft per year recommend

2011 Analysis
(acre-ft per year)

Decade	BASE RUN3	2010	2020	2030	2040	2050	2060
Minimum Annual Diversion	94,943	97,255	-	-	-	-	99,932
Firm Yield	46,160	78,344	-	-	-	-	99,932
Recommended Availability	-	97,255	97,255	97,255	97,255	97,255	97,255

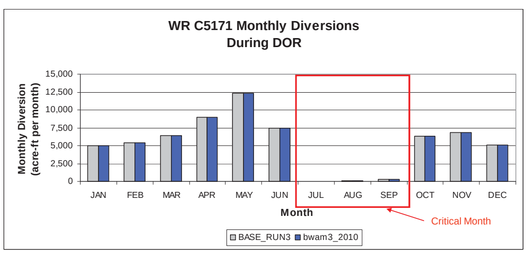
Source: 3461205171 – GCWA RoR

REGION H Water Planning Group



Source: 3461205171 – GCWA RoR

REGION H Water Planning Group



Source: 3461205171 - Summary

REGION H Water Planning Group

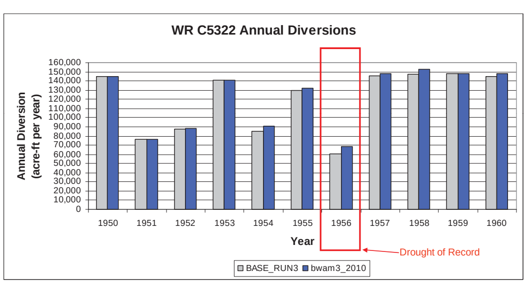
- Permitted Diversion: 125,000 acre-ft per year
- 2006 Plan Recommended: 72,388 acre-ft per year
- 2011 Plan: 64,159 acre-ft per year recommended

2011 Analysis
(acre-ft per year)

Decade	BASE RUN3	2010	2020	2030	2040	2050	2060
Minimum Annual Diversion	60,892	64,159	-	-	-	-	69,204
Firm Yield	0	0	-	-	-	-	0
Recommended Availability	-	64,159	64,159	64,159	64,159	64,159	64,159

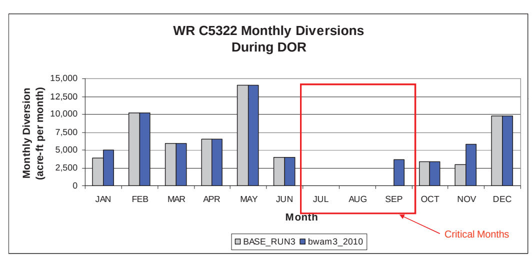
Source: 3461205322B – GCWA RoR

REGION H Water Planning Group



Source: 3461205322B – GCWA RoR

REGION H Water Planning Group



Source: 3461205322B - Summary

- Permitted Diversion: 155,000 acre-ft per year
- 2006 Plan Recommended: 63,812 acre-ft per year
- 2011 Plan: 68,402 acre-ft per year recommended

2011 Analysis
(acre-ft per year)

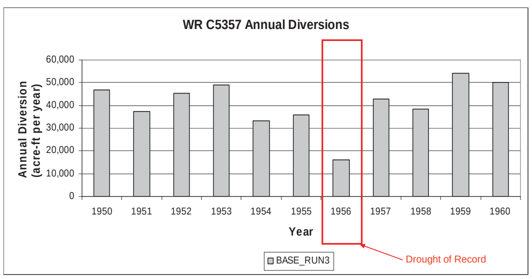
Decade	BASE RUN3	2010	2020	2030	2040	2050	2060
Minimum Annual Diversion	60,691	68,402	-	-	-	-	68,530
Firm Yield	0	0	-	-	-	-	0
Recommended Availability	-	68,402	68,402	68,402	68,402	68,402	68,402

Task 3 – Surface Water Supply

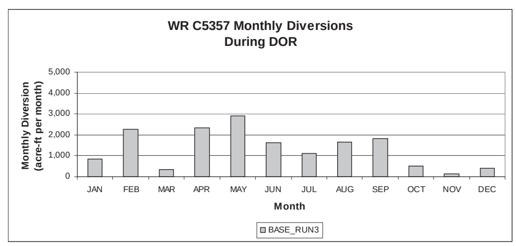
SAN JACINTO - BRAZOS BASIN

Source	Owner	2006 Plan (afy)	2011 Analysis (afy)	Change (afy)
3411104449	PVT IRR	558	1,200	642
3411104509	PVT IRR	1,025	2,028	1,003
3461105350	HL&P - Webster Plant	2,120	2,120	0
3461105357A	**GCWA**	**17,600**	**15,930**	**-1,670**
3461105357B	GCWA	0	0	0
3461105357C	GCWA	0	0	0
3461105169	**GCWA**	**3,842**	**0**	**-3,842**
3461105170	FBC WCID #1	6,890	5,634	-1,256
3461105343	PVT IRR	711	720	9
3461105344	PVT IRR	962	1,320	358
3461105346	PVT IRR	1,360	2,214	854
3461105352	PVT IRR	3,347	3,271	-76
3461105364	PVT IRR	766	734	-32
TOTAL		**39,181**	**35,171**	**-4,010**

Source: 3461205357 – GCWA RoR



Source: 3461205357 – GCWA RoR



Source: 3461205357 - Summary

- Permitted Diversion: 57,500 acre-ft per year
- 2006 Plan Recommended: 17,600 acre-ft per year
- 2011 Plan: 13,800 acre-ft per year recommended due to modeling of reservoir storage

2011 Analysis
(acre-ft per year)

Decade	BASE RUN3	2010	2020	2030	2040	2050	2060
Minimum Annual Diversion	15,930	15,930	15,930	15,930	15,930	15,930	15,930
Firm Yield	13,800	13,800	13,800	13,800	13,800	13,800	13,800
Recommended Availability	-	15,930	15,930	15,930	15,930	15,930	15,930

Task 3 – Surface Water Supply

Colorado – Brazos Basin

- Available supplies are equal to contracts from Philips Petroleum (12,019 acre-ft per year)

Neches Basin

- Available supplies are equal to contracts from LNVA (60,727 acre-ft per year)

Task 3 – Resource Allocation

General Methodology

- Allocate groundwater supplies according to local restrictions
- Allocate surface water supplies according to WWP contracts and water rights
  - If WUG is found in multiple counties, the supply was split according to surface water demand
- Assumed Livestock entries were provided by local supply sources
- 2006 Plan: Mining WUGs with shortages in 2000 were assumed to be supplied from local surface supplies equal to their shortage.
  - 2011 Plan will adopt the local supply numbers identified in 2006 Plan

Task 3 – Resource Allocation

Groundwater Supplies by County

Adequate Supplies

- Austin County
- Leon County
- Madison County
- Polk County
- San Jacinto County
- Trinity County
- Walker County

Inadequate Supplies

- Brazoria County
- Chambers County
- Galveston County
- Harris County
- Fort Bend County
- Liberty County
- Montgomery County
- Waller County

Task 3 – Shortage Analysis

Shortage Analysis

All values are in acre-ft per year

County	2010	2020	2030	2040	2050	2060
AUSTIN	0	-739	-1,240	-1,496	-1,635	-1,865
BRAZORIA	-142,511	-167,318	-196,542	-226,084	-255,793	-290,333
CHAMBERS	-42,895	-47,773	-51,179	-54,488	-57,696	-60,950
FORT BEND	-34,266	-33,232	-73,678	-102,519	-142,195	-187,241
GALVESTON	-18,292	-18,162	-19,485	-22,677	-26,104	-31,036
HARRIS	-94,318	-222,282	-287,798	-341,446	-393,772	-441,923
LEON	-64	-436	-671	-765	-838	-966
LIBERTY	-11,846	-14,761	-18,124	-21,805	-26,134	-31,378
MADISON	-1	-130	-228	-239	-323	-450
MONTGOMERY	-17,244	-47,319	-69,460	-95,749	-134,675	-179,198
POLK	0	-187	-313	-404	-552	-728
SAN JACINTO	-492	-850	-1,131	-1,317	-1,426	-1,511
TRINITY	0	-2	-1	0	0	0
WALKER	0	-816	-1,651	-1,963	-2,374	-2,843
WALLER	0	-1,776	-2,964	-4,479	-6,786	-9,959
TOTAL SHORTAGE	-361,929	-555,783	-724,465	-875,431	-1,050,303	-1,240,380

Task 3 – Water Supply Analysis

Draft Chapter 3

- ~~*Item 15:* Consider and take action on approving the Draft Chapter 3 made available on the Region H website prior to the meeting~~

- Informal approval to be requested at next meeting.

- Posted to Region H website by July 8th.

Task 4 – WMS Selection

Strategies Considered in 2006 RWP

- Conservation Strategies
- Expand/Continue Contracts
- Reservoir Strategies
- Water Rights Strategies
- Reuse Strategies
- Allocation/Transfer Strategies
- Other Strategies

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Conservation Strategies

- ✔ Municipal Conservation
- ✔ Irrigation Conservation
- ✔ Industrial Conservation

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Reservoir Strategies

- ✔ Allens Creek
- Bedias
- Little River
- ✔ Little-River Off-Channel

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Water Rights Strategies

- ✔ Houston/SJRA Lake Houston Permit
- ✔ Houston/SJRA ROR Permit
- ✔ Re-designation of Existing Permits

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Reuse Strategies

- ✔ Wastewater Reclamation for Industry
- ✔ Houston Indirect Wastewater Reuse
- ✔ NHCRWA Indirect Wastewater Reuse

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Allocation/Transfer Strategies

- ✔ Contractual Transfers
- BRA Voluntary Redistribution
- ✔ Houston to GCWA Transfer
- ✔ Increase Current Contracts
- Bedias to SJRA Transfer
- ✔ TRA to Houston Contract
- ✔ Luce Bayou Transfer
- Sabine to Region H Transfer
- ✔ TRA to SJRA Contract

Task 4 – WMS Selection

REGION H Water Planning Group

2006 Other Strategies

- ✔ BRA System Operations Permit
- ✔ Expanded Use of Groundwater
- ✔ Freeport Desalination
- ✔ Brazos Salt Water Barrier

Task 4 – WMS Selection

REGION H
Water Planning Group

Water Provider Survey

- Survey sent to:
  - Systems responsible for providing water to other in 2006 RWP
  - Other parties that may play a key role in future water supply for the region
- Received three responses:
  - BRA
  - NFBWA
  - WHCRWA
- Encourage input in order to incorporate strategies into Plan
  - Jason Afinowicz: *jason.afinowicz@aecom.com*

Appendix 10E

Public Hearing Materials
March 30, 2010

This Page Intentionally
Left Blank

Contents – March 30, 2010 Public Hearing

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-7111

TO:

- Each mayor of a municipality with a population of 1,000 or more or which is a county seat that is located in whole or in part in the Region H water planning area;
- Each county judge of a county located in whole or in part in the Region H water planning area;
- Each special or general law district or river authority with responsibility to manage or supply water in the Region H water planning area based upon lists of such water districts and river authorities obtained from Texas Commission on Environmental Quality;
- Each retail public utility, defined as a community water system, that serves any part of the Region H water planning area or receives water from the Region H water planning area based upon lists of such entities obtained from Texas Commission on Environmental Quality; and
- Each holder of record of a water right for the use of surface water the diversion of which occurs in the Region H water planning area based upon lists of such water rights holders obtained from Texas Commission on Environmental Quality.

RE: **Public Notice of an *Initially Prepared 2011 Region H Water Plan (IPP)***

DATE: February 26, 2010

PUBLIC NOTICE

To All Interested Parties:

The Region H Water Planning Group area includes all or part of the following counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker, and Waller.

Notice is hereby given that the Region H Water Planning Group (RHWPG) is requesting public review and comment on an Initially Prepared 2011Region H Water Plan (the IPP).

A summary of the content of the Draft Initially Prepared Plan: The *Initially Prepared Plan (IPP)* updates the 2006 Region H Water Plan that was included in the 2007 State Water Plan prepared by the Texas Water Development Board (TWDB). The IPP addresses the following topics:

- Water needs based on projected population and water demand
- Water supplies available to meet projected water demand
- Water management strategies for meeting any identified water shortages
- Socioeconomic impact of not addressing shortages
- Impacts of Management Strategies on Water Quality and Agricultural Areas
- Water Conservation and Drought Management

- Protection of Water Resources and Natural Resources
- Proposed Unique Stream Segments
- Proposed Unique Reservoir Sites
- Regulatory, Administrative and Legislative Recommendations

Public Comment: Public hearings to receive public comment on the IPP will be held at the following dates and locations:

> **March 30, 6:30 p.m**.
> Houston-Galveston Area Council
> 3555 Timmons, 2nd Floor, Room A
> Houston, Texas 77027
>
> **April 1, 6:30 p.m**.
> Truman Kimbro Convention Center
> 111 West Trinity
> Madisonville, Texas 77864
>
> **April 7, 10 a.m**.
> Lone Star Convention Center
> 9055 FM 1484
> Conroe, Texas 77303

The RHWPG will accept written comments until 5:00 p.m. June 8, 2010. Written comments should be provided to:

> Hon. Mark Evans
> Chair, RHWPG
> c/o San Jacinto River Authority
> P.O. Box 329
> Conroe, Texas 77305-0329
>
> J. Kevin Ward
> Executive Administrator
> Texas Water Development Board
> P.O. Box 13231
> Austin, Texas 78711-3231

Questions or requests for additional information may be submitted to: Reed Eichelberger, General Manager, San Jacinto River Authority, P.O. Box 329, Conroe, TX 77305-0329, telephone 936-588-7111. The San Jacinto River Authority is the Administrator for the RHWPG.

A copy of the Initially Prepared Plan for 2011 is available at the County Clerk's Office and at a depository library in each county in Region H. A list of depositories is attached. A copy also is available on the RHWPG website at www.regionhwater.org and on the regional planning section of the TWDB website at www.twdb.state.tx.us/wrpi/rwp/rwp.htm.

DEPOSITORY LIBRARIES IN REGION H

AUSTIN COUNTY
Gordon Library
917 Circle Drive
Sealy, TX 77474

BRAZORIA COUNTY
Angleton Public Library
401 East Cedar
Angleton, TX 77515

CHAMBERS COUNTY
Chambers County Library
– Main Branch
202 Cummings
Anahuac, TX 77514

FORT BEND COUNTY
George Memorial Library
1001 Golfview
Richmond, TX 77469

GALVESTON COUNTY
Rosenberg Library
2310 Sealy
Galveston, TX 77550

HARRIS COUNTY
Houston Public Library - Central
1st Floor, Bibliographic Information Center
500 McKinney
Houston, TX 77002

LEON COUNTY
Ward Memorial Library
207 East St. Mary's
Centerville, TX 75833

LIBERTY COUNTY
Sam Houston Regional Library
and Research Center
650 FM1011
Liberty, TX 77575

MADISON COUNTY
Madison County Library
605 South May
Madisonville, TX 77864

MONTGOMERY COUNTY
Montgomery County Central Library
104 Interstate 45 North
Conroe, TX 77301

POLK COUNTY
Murphy Memorial Library
601 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
Coldspring Area Public Library
14221 State Highway 150 West
Coldspring, TX 77331

TRINITY COUNTY
Blanche K. Werner Library
203 Prospect Drive
Trinity, TX 75862

WALKER COUNTY
Huntsville Public Library
1216 – 14th Street
Huntsville, TX 77340

WALLER COUNTY
Waller County Library -
Brookshire/Pattison
3815 Sixth Street
Brookshire, TX 77423

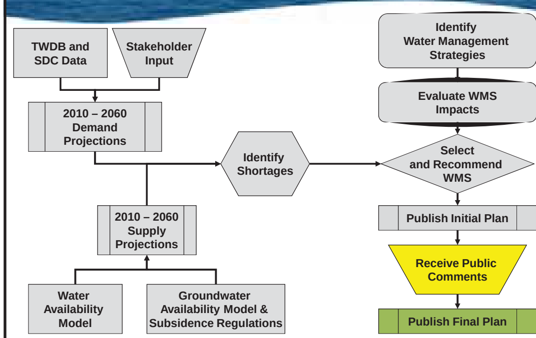
Region H Water Planning Group
Public Hearing for
2011 Initially Prepared Plan

March 30, 2010
Houston-Galveston Area Council, Houston

Regional Water Plan Overview

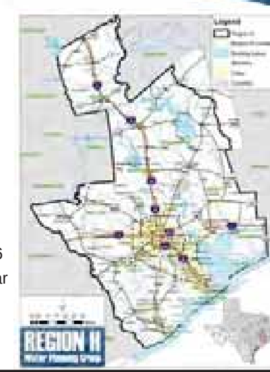
- Region H Overview
- Population and Water Demand Projections
- Water Supply Estimates
- Water Management Strategies
- Protection of Water Resources
- Unique Stream Segments & Reservoirs
- Administrative, Regulatory and Legislative Recommendations
- Infrastructure Financing Survey and Recommendations
- Special Studies

Regional Water Planning Process



Regional Water Planning

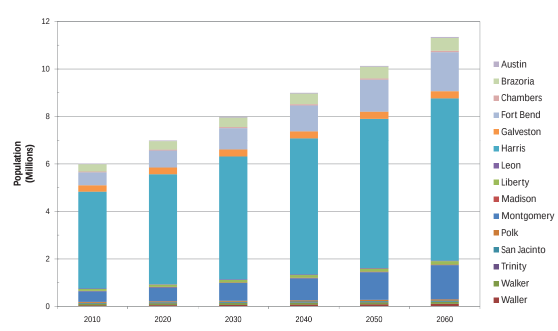
- 16 Planning Regions
- Region H
  - 15 Counties
  - 3 River Basins
  - 4 Coastal Basins
  - 2 Major Aquifers
  - 4 Minor Aquifers
- 50-year water plan (2010-2060), updated every 5 years
  - Previous Plans: 2001 and 2006
- State Water Plan published one year after final regional plans



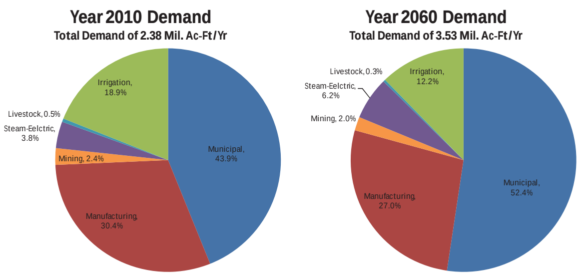
Population and Water Demand Development

- Revision to values in the 2006 Regional Water Plan
- Updated population and associated demand with data from various sources:
  - State Data Center
  - Texas Water Development Board
  - Individual communities and water authorities
- Approved by Region H in public meetings
  - May and July, 2009
- Approved by Texas Water Development Board in October, 2009

Population Growth



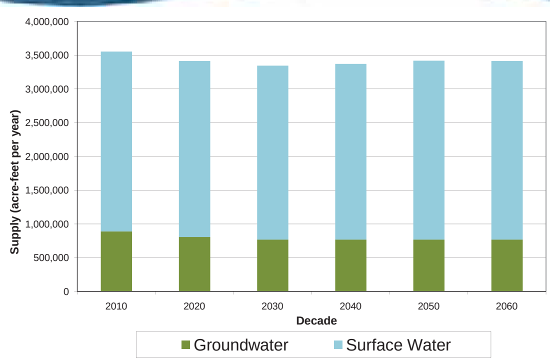
Demand Comparison – 2010 and 2060



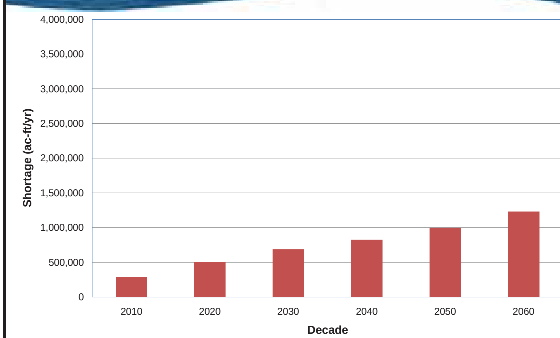
Available Water Supplies

- Supplies determined by
  - Surface Water Availability Model (drought of record)
  - Groundwater Availability Model or local regulations
- Total Existing Supplies
  - 3,561,017 acre-feet per year
  - 75% surface water
  - 25% groundwater
- 2060 Available Supplies
  - 3,415,860 acre-feet per year
  - Groundwater use reduced by regulation
  - Reservoir storage reduced by sedimentation

Existing and Projected Water Supplies



Projected Supply Deficit



Selected Management Strategies

- Conservation Strategies
  - Industrial
  - Irrigation
  - Municipal
- Contractual Strategies
  - Contracts to water users (WUGs)
  - Contracts among water providers (WWPs)
- Groundwater Strategies
  - Expanded Use of Groundwater
  - Interim Groundwater Use
  - New Groundwater Wells for Livestock

Selected Management Strategies

- Groundwater Reduction Plans
  - City of Houston
  - North Harris County Regional Water Authority
  - Others
- Reservoir Strategies
  - Allen's Creek Reservoir
  - Gulf Coast Water Authority Off-Channel Reservoir
  - Millican Reservoir
- Permit Strategies
  - Brazos River Authority System Operations
  - Houston Bayous Permit

Selected Management Strategies

- Reuse Strategies
  - Houston Indirect Wastewater Reuse
  - Wastewater Reclamation for Industry
  - Wastewater Reclamation for Municipal Irrigation
  - Others
- Infrastructure Strategies
  - Luce Bayou Transfer
  - COH, NHCRWA, WHCRWA, CHCRWA, and NFBWA Transmission and Distribution Systems
  - CLCND West Chambers County System
  - Others

Selected Management Strategies

- Other Strategies
  - Brazoria County Interruptible Supplies
  - Brazos Saltwater Barrier

Major Water Management Strategies

Major WMS	Sponsor	Selected Strategy	Projected Start Decade	2010	2020	2030	2040	2050	2060
				Total Allocated (ac-ft/yr)					
Reservoirs									
Allens Creek Reservoir	BRA / Houston	Y	2020	-	76,441	93,688	97,954	99,580	99,650
GCWA Off-Channel Reservoir	GCWA	Y	2030	-	-	39,500	39,500	39,500	39,500
Millican Reservoir (Panther Creek Dam)	BRA	Y	2040	-	-	-	11,627	58,351	120,994
Contractual Strategies									
TRA to Houston Contract	TRA / Houston	Y	2030	-	-	116,738	123,524	123,524	123,524
TRA to SJRA contract	TRA / SJRA	Y	2040	-	-	-	7,935	39,096	76,476
Reclamation/Reuse									
Houston Indirect Wastewater Reuse	Houston	Y	2040	-	-	-	66,420	114,679	128,801
NHCRWA Indirect Wastewater Reuse	NHCRWA	Y	2040	-	-	-	7,300	16,300	16,300
Wastewater Reclamation for Industry	Houston, Manufacturing	Y	2060	-	-	-	-	-	67,200
Permit Strategies / Other									
Brazoria Interruptible Supplies for Irrigation	GCWA	Y	2010	104,977	86,759	64,000	64,000	64,000	64,000
BRA System Operations Permit	BRA	Y	2020	-	6,621	18,870	25,350	25,350	25,350
Interim Strategies	NA	Y	2010	45,512	-	-	-	-	-
Total				**150,489**	**169,821**	**332,796**	**443,610**	**580,380**	**761,795**

Protection of Water Resources

- Water Conservation
  - Recommended as the first strategy
  - Applied to meet projected shortages
- Strategy Selection Process
  - Yield and environmental impacts were considered with the unit cost of water
- Existing Supplies
  - Utilized prior to recommending new water supply projects
- Reuse
  - Included in Fort Bend, Harris County and Montgomery
  - Recommended in lieu of additional imports/reservoirs

Unique Stream Segments

- Eight stream segments were selected in 2006 and adopted by Texas Legislature:
  - Armand Bayou
  - Austin Bayou
  - Bastrop Bayou
  - Big Creek (Fort Bend)
  - Big Creek (San Jacinto)
  - Cedar Lake Creek
  - Menard Creek
  - Oyster Bayou
- 2011 Regional Water Plan retains the designations for these sites

Unique Stream Segments

Unique Reservoir Sites

REGION H Water Planning Group

- 2011 Regional Water Plan includes five Unique Reservoir Sites
  - Four already designated
    - Allens Creek Reservoir *– 2011 Selected Strategy*
    - Little River Reservoir
    - Little River Off-Channel Reservoir
    - Bedias Reservoir
  - One recommended for designation
    - Millican Reservoir *– 2011 Selected Strategy*

Unique Reservoir Sites

REGION H Water Planning Group

Designated Sites

- Allens Creek Reservoir
  - Strategy in 2001, 2006, and ***2011*** RWPs
  - Austin County
- Little River Reservoir
  - Strategy in 2001 RWP
  - Milam County
- Little River Off-Channel
  - Strategy in 2006 RWP
  - Milam County
- Bedias Reservoir
  - Strategy in 2001 RWP
  - Grimes, Madison, and Walker Counties

Unique Reservoir Sites

REGION H Water Planning Group

Millican Reservoir

- Not yet designated by Texas Legislature
- Recommended in 2011 Region H Plan
- Location:
  - Primarily Brazos, Grimes, and Madison Counties
  - Located on Navasota River
- Yield: 194,500 afy
- Capital Cost:
  - $1,159,907,000

Policy Recommendations

REGION H Water Planning Group

- Retained 15 Recommendations from 2006 Plan
  - 3 Administrative and Regulatory Recommendations
  - 12 Legislative Recommendations
- One New Legislative Recommendation
  - *Direct the State Demographer's Office to explore the potential changes in population distribution made possible by rapid advancements in information technology.*

Water Infrastructure Financing

REGION H Water Planning Group

Infrastructure Funding Requirements

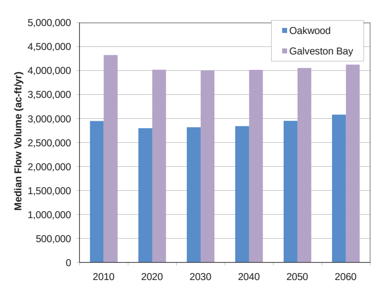
- Capital Costs for the 2011 Region H Water Plan
  - Estimated at $12.9 Billion (2008 Dollars)
- Water Infrastructure Financing (WIF) Survey
  - 2011 Survey will utilize TWDB Web based tool
  - Objectives:
    - Determine number of entities with finance needs
    - Identify infrastructure costs that cannot be financed locally
    - Summarize each WIF project and location in Plan

Special Studies in the 2011 Plan

REGION H Water Planning Group

Impacts of 2006 Strategies to Galveston Bay

- Modeled Impacts Over Time (2010 – 2060)
- Considered Upstream Impacts
- Near-term reductions in flow offset by higher return flows in long-term
- Mitigate increased water usage in later decades



Special Studies in the 2011 Plan

Water Conservation

- Conservation Survey
  - Included municipal, industrial and commercial conservation
  - Additional conservation plans obtained from TWDB
- Conservation Management Strategies
  - No change to Irrigation conservation strategies from 2006 RWP
  - WUG specific strategies where applicable
  - 3-tiered municipal strategy based on WUG size for other municipal WUGs
  - Conservation used to address over 200 WUG shortages

Public Comment on the IPP

- IPP Available:
  - *http://www.regionhwater.org*
  - *County Clerk's Office in each county*
  - *Depository library in each county*
- Public Hearings
  - Tuesday, March 30th @ 6:30 PM – Houston
    - Houston-Galveston Area Council
  - Thursday April 1st @ 6:30 PM– Madisonville
    - Truman Kimbro Convention Center
  - Wednesday, April 7th @ 10:00 AM – Conroe
    - Lone Star Convention and Expo Center

Public Comment on the IPP

- Taking comments through:
  - *5:00 PM June 8, 2010*
- Please submit comments to:
  - Hon. Mark Evans
Chair, Region H Water Planning Group
c/o San Jacinto River Authority
P.O. Box 329
Conroe, TX 77305-0329
  - J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Questions and Comments

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - March 30, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

Region H Water Plan

NAME: Brandt Mannchen

AFFILIATION: Houston Sierra Club

ADDRESS: 5431 Carew Houston | Tx. | 77096
City | State | Zip

713-664-5962 | |
Telephone | Fax | E-Mail

REGION H WATER PLANNING GROUP

PUBLIC HEARING

TUESDAY, MARCH 30, 2010

HOUSTON-GALVESTON AREA COUNCIL

3555 TIMMONS

HOUSTON, TEXAS

6:00 P.M.

Transcript provided by:

The Captioning Company

P. O. Box 441179

Houston, Texas 77244-1179

(281) 684-8973 (cell)

(281) 347-2881 (fax)

captioningcompany@comcast.net

MR. BARTOS: Probably everyone can hear me without the mic. Can everyone hear me? Well, welcome to the public hearing of the initially prepared plan I guess for the 2011 Region H plan. Appreciate everybody coming tonight.

My name is John Bartos. I've been on the Region H Planning Group since it started I guess in 1997, something like that. And it's an interesting process. I guess most people think that -- they only think about water when they turn on the faucet and nothing comes on, but at any rate, welcome. I appreciate you coming and I appreciate your interest.

We have other members of the Regional Planning Group who are here tonight -- Pudge Willcox and Gena Leathers -- and I think that's all we have.

And the format tonight is going to be we're going to have a presentation by the consulting team of the regional plan for 2011. And afterwards, we're going to have an opportunity for public comment. On the back table there is three different documents: One is -- has a little yellow stripe on it if you want to be added to the Region H mailing list and if you have interest in all this. Another one has a green stripe on it, and if you want to speak tonight and have public comments or questions, please fill that out and hand it to Glenda Callaway sitting over here. And the third document is a little form in case you want to make written comments tonight. But be advised that you also have until June 8th to make comments if you want to go home and think about it for a little bit.

I want to thank tonight Carl Masterson at HGAC for allowing us to have this hearing here. Thank you, Carl.

MR. MASTERSON: You're welcome.

MR. BARTOS: And I would like to then turn this over to -- I guess you're our lead project manager on this. Is that the title? Jason Afinowicz, and I'll let you introduce your team and start with the presentation.

MR. AFINOWICZ: All right, thank you, John. My name is Jason Afinowicz, and I'm joined here today with two other consultants, Cory Stull and Philip Taucer, and also from KBR we have Karim El Kheiashy, Chris Krueger on that side of the room and also John Seifert from LBG-Guyton has been helping us out with this portion of the plan. The general idea of what we're going to go through right now is a short summary of the plan. Obviously it's a large document, but we're going to just go through this and give you a little bit to talk about.

MR. BARTOS: Can I interrupt you. I neglected to mention Temple McKinnon from the Water Development Board. She needs to be introduced. Sorry.

MR. AFINOWICZ: And introduce Glenda as well.

MS. CALLAWAY: I figured I needed no introduction.

MR. AFINOWICZ: Glenda who needs no introduction to the group.

Well, just to get started, what we're going to talk about is a quick overview of what Region H is and discuss the population water demand estimates, determination of supply and the identification of needs of these unmet demands and then to talk about the strategies that were identified for meeting these shortages.

Also be some discussion about unique stream and reservoir sites, administrative and regulatory recommendations which are also part of the plan and then also how all of this gets paid for, the infrastructure funding portion of the plan development. And at the end, a couple of special studies that were included in this plan.

To give you an overall idea of how this process works, the regional planning process starts at the very beginning with bringing in information from demands, supplies and identifying what shortages need to be met out into a 50 year horizon. Once that's done, other strategies are identified for meeting any unmet shortages. At that point, the plan is put together. What we put together now is the initially prepared plan that was approved by funding group and that is currently out for public comment just like what we're doing right here tonight.

Once those comments have been received and processed and incorporated into the plan where appropriate, finally a draft plan will be submitted by September 1st of this year. Region H itself consists of 15 counties, three river basins -- the Trinity, Brazos and San Jacinto -- four coastal basins, two major aquifers, the Gulf Coast and Carrizo-Wilcox and also four minor aquifers so there are significant number of water resources to be considered as part of this plan.

As we mentioned before, this is a 50 year plan which will look at needs from the year 2010 out to 2060. And this plan is updated every five years as part of the regular regional planning process.

After this plan is completed and plans for the other regions throughout the state are put together, those will ultimately be put together into the state water plan which will be published this 2012.

Starting with population water demands -- the basis for the demand use in this plan are actually the ones that were originally used in the 2006 regional plan. These were based on the 2000 census. And lacking a census to update these numbers for this plan round, various different sources were used to update that information, that included data from State Data Center, Texas Water Development Board, and actually the individual municipalities, utility districts and other organizations.

Information was mailed out to all these entities and requesting input on what their ideas were for long term population and demand projections. This information was considered by the Region H Planning Group and approved in a public meeting last year. And these numbers were also considered by the Texas Water Development Board before they were finalized to be put into the initially prepared plan.

This gives you an idea of projected population growth over the years. 2010 you see a population of approximately 6 million in the Region H area. That grows to as much as 11 million out in the year 2060. You'll see a large portion of that demand is in Harris County right there in the middle; but also significant to that is the growth in the suburban counties such as Fort Bend, Brazoria, Montgomery County. Those have also shown a very large amount of growth proportionately over the years.

Once these population projections are considered along with what the per capita usages are for individual people, how much water does each person use, how much water do industries use, we're able to look at what demands are in both 2010 and 2060 you see here. The demand in 2010 of just over 2.3 million acre-feet per year grows to 3.53. That's a growth of about 50 percent over that planning term. Also you'll see the growth in municipal demand becomes a larger portion of the total demand between those two years.

Supplies were determined as the other half of this equation of what can be used to meet these needs. And these supplies were determined from surface availability models, the WAMS as they are known. The groundwater availability models or the GAMS for groundwater sources. Altogether this represents just over 3.5 million acre-feet per year of supply currently. And this is broken out to about 75 percent surface water, a quarter of that being groundwater. By the year 2060 those supplies shrink somewhat because of regulation groundwater declining supply and also reservoir sedimentation. This gives you an idea of how those supplies change over time. And again the split between surface water on the top and groundwater down below.

When those are compared to the demands over time, we see that there is a constant growth of shortages that cannot be met by current supplies. It doesn't mean we looked at the overall region, the overall supplies and decided what was missing in between. There are certain supplies that just can't be used to meet certain demands. These shortages take that fact into account as the deficits grow over time.

Once the shortages were identified, the next step was to identify strategies to meet these projected shortages out in the future. And starting off the first strategies applied were conservation strategies for all sorts of uses, irrigation, industrial and municipal. And we'll talk a little bit more about the municipal conservation strategies later on.

Contractual strategies were used wherever possible as in some wholesale water providers or entities that sell water may have additional supplies that need to be contracted to water users. And so contracts to water users and contracts between these wholesale water providers were considered to sources that already existed before developing new strategies. Groundwater strategies were also incorporated to expand on the current use of groundwater wherever possible, but within regulation. And interim groundwater usage or strategies that couldn't be met by other means and also some of the groundwater wells for livestock in a few cases.

Groundwater reduction plans have been implemented by various entities in the Houston area, and this includes the City of Houston, North Harris County Regional

Water Authority, West Harris County Regional Water Authority, so on and so forth. And these to the extent possible have been incorporated into the Region H plan to build upon the planning that's already been done by these different organizations.

Reservoir strategies have also been recommended as in the 2001 and 2006 regional plans. Allens Creek Reservoir is recommended as near term strategy. Also reservoir -- small reservoirs have been recommended in Brazoria County for the Gulf Coast Water Authority to convert some of their interruptible supplies. In addition, Millican Reservoir shared between Regions G and H has also been recommended to meet shortages in the lower Brazos Basin. Permit strategies have also been considered.

One that's been ongoing for many years is the Brazos River Authority systems operations permit which is an opportunity to get more yield out of their existing system without building new reservoirs. The Houston bayous permit is included in this point to develop an interruptible supply source that would not replace firm yield supplies, but just be used in lieu of them to reduce operational costs.

The plan includes a large amount of reuse, which includes small purple pipe systems for direct reuse. A strategy for direct reuse for industry and also indirect strategy for City of Houston, North Harris County Regional Water Authority and others.

There are also infrastructure strategies such as Luce Bayou which has been a hot topic lately. That project is moving forward and continued in this plan as a recommended strategy but also the systems for the City of Houston, the water authorities and so forth have also been incorporated in here to get an idea of the infrastructure needs. The Chambers and Liberty Counties Navigation Districts, West Chambers County System has also been included in this plan for the first time.

And finally, a strategy for interruptible supplies for irrigation in Brazoria County is incorporated and this kind of mirrors the way water is sold and used in Brazoria County right now that frees up additional water for other needs and the Brazos saltwater barrier is recommended as a strategy not for increasing firm yield but for increasing the availability of water during dry periods.

This table gives a short summary of when strategies are projected to come online and their magnitudes. You see some of those strategies like the Brazoria interruptible supplies that are required immediately in 2010, while others like Millican Reservoir or wastewater reclamation for industry, one of the City of Houston reuse projects come on later about 2040 for Millican, 2060 for reclamation.

A key part of the plan is protection of existing water resources, and to do that water conservation was identified as an important aspect of the plan. And this was recommended as a first strategy before applying other water management strategies. And it was applied to meet several of these shortages or at least reduce those that couldn't be eliminated through conservation.

The selection process considered many different aspects, more than just cost on how the strategies will impact the region. These are environmental aspects and other impacts to water resources. Existing supplies were used wherever possible. And also reuse as we mentioned before was implemented in several different occasions through the plan.

Unique stream segments are a designation that the Planning Group can recommend for certain streams of particular characteristics, and in the last plan, the 2006 plan, the Planning Group elected to nominate eight segments as unique stream segments. These same recommendations, although they have been adopted by the legislature, have been carried forward into the 2011 plan without any change. This map gives you an idea of where those are located. You see they are kind of spread throughout the region northern and southern portions.

The opposite of the unique stream segments you could say is the unique reservoir sites. These sites identify locations of key significance for future water resources development, and there are altogether five that are included in the 2011 plan. Four of these have already been designated by the legislature. Although only one of these is actually recommended as a strategy in the 2011 plan. This will be Allens Creek Reservoir in Austin County. The new reservoir that is recommended as designation at this time is Millican Reservoir which has been selected as a strategy in this plan to meet needs of the lower Brazos basin.

This gives you an idea of the locations of the already designated sites. Allens Creek, again, in Austin County, Little River in the Little River Off Channel Reservoirs in Milam County and Bedias Reservoir primarily in Madison County. Millican Reservoir is a strategy that has been in the past plans, but never included as a recommended strategy. It's not yet designated as a unique reservoir site. It is recommended as a strategy this go round, and it is located primarily in Brazos, Grimes and Madison Counties. And this as a project of substantial yield, almost 200,000 acre-feet, although there is a large cost that comes along with that.

The regional planning process also gives an opportunity for the Planning Groups to make certain policy recommendations. There were 15 recommendations in the 2006 plan that were carried over into this 2011 plan. Three of these are being administrative and regulatory recommendations and 12 being legislative recommendations. In this plan, there is one new legislative recommendation that's included. And that is as you see there, to direct the state demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology. Just to translate that into short simple message, that is recognizing that changes in technology have allowed for future growth in areas that traditionally have not seen growth, perhaps rural areas where people can telecommute and work from home. There is not really any guidance at this point on how that will affect long term populations, but this does direct the state to consider that in their future population projections.

All these projects come with cost. And one chapter of the plan looks at these costs and how these projects are going to be financed. The capital costs just for these projects recommended in the 2011 plan are estimated at nearly $13 billion, present day dollars. To identify how these projects are going to be funded and identify future needs from the state, there will be a survey that is sent out to all the water user groups that have a strategy that will be coming up over the next 50 years that will simply ask them what are your needs? How do you plan to fund it? And what can the state consider as future needs for funding and assisting with these projects?

And this is going to be put together as we go through the public comment period now that the initially prepared plan has been put together.

One of the special studies that was considered in the 2011 plan is the impact water management strategies to Galveston Bay. Already a previous study that was published by the Planning Group looked at what were the impacts in the year 2060 of different strategies. This project goes just a little bit farther to look at what are the changes over time and what are the impacts from those strategies in every decade between now and 2060.

This considered upstream impacts primarily from Region C and looked at what would reductions and return flows from Region C do in reuse and conservation projects that they were to do to water availability in the lower part of the Trinity Basin and how does that interact with diversion for Region H needs.

This is a quick graphic here to show you a little bit of that information. There are two points here, one of them showing flow -- these are median flows showing median flows at Oakwood which is a gauged site located approximately upstream Region C and Region H downstream. And also flows in the Galveston Bay. You see a decline in the near term of some of those flows from the year 2010 to 2020 which is in conjunction with higher level also of reuse in the upper basin, but over time, even though Region H strategies come online using more water, you see an overall increase out to 2060 of total flows to Galveston Bay. And that is mitigated partially by new water supplies coming into the upper basin in Region C and metroplex.

Water conservation was also another topic to be considered in this plan, conservation has always been part of the Region H plans and there was a conservation survey done to examine what sort of conservation practices were being implemented and what sort of impacts could be identified. A survey was sent out to municipal, industrial and commercial users to try to identify this as much as possible.

In general, some of the changes were not that drastic compared to the 2006 plan. And irrigation conservation was not changed. There was not considerable information for that. However, municipal users did provide some information that gave us the ability to recommend very specific strategies based on what's in their conservation plans. And also helped guide the development of new generic conservation plans that could be applied to water users that didn't have specifics in their current plans. And this conservation was used to meet the needs, at least partially, of over 200 water users within the region.

MR. BARTOS: Water user groups?

MR. AFINOWICZ: That's right. And at that point we get to the portion where we can talk about public comments. Just to remind you of a few things before we get there, the initially prepared plan that's been approved by the group is available on the website and county clerk's office and in the library in every county, and there are three public hearings scheduled. One of those which is going on right now and two, one this next Thursday and one the following Wednesday that will be held to take public comment on this initially prepared plan so they can be considered by the Planning Group in developing the final plan. These comments will be taken through June 8th as John mentioned earlier. And they can be submitted to the chair of the Region H Planning Group and also to the Water Development Board.

MR. BARTOS: Okay, thank you, Jason. Let me ask you, Jason, is this presentation that you have -- will that be available on the website?

MR. AFINOWICZ: We can make that available. That won't be a problem.

MR. BARTOS: The actual plan is what -- about six or ten inches thick, something like that?

MR. AFINOWICZ: That's right. It's a substantial document and the best way to get a good handle on it is just to take a look at the executive summary.

MR. BARTOS: There you go.

MR. AFINOWICZ: That will give you the shortcut.

MR. BARTOS: Look at the executive summary or look at this presentation as well.

What I'd like to do now is to open this up to public comment. We have a fairly small group here so I think we can be liberal about that and if it's okay with the consultants here, after the public comment if people from the public have questions and answers, is that appropriate that we can do that?

MR. AFINOWICZ: I believe so.

MR. BARTOS: Okay. I have -- if anyone else has -- wants to make an official public comment, please fill out one of these green cards which is over on the side.

I just have one so far, and that's from Brandt Mannchen from the Houston Sierra Club, and I will tell you that Brandt attends all the meetings and he's one of the few people including people probably on this group that has read those six to eight inches of documents. But anyway, Brandt, public comment, please.

MR. MANNCHEN: Can you hear me? Can you hear me now? My name is Brandt Mannchen. I'm with the Houston Sierra Club.

MS. CALLAWAY: There should be a button to push.

MR. MANNCHEN: Is that okay? My name is Brandt Mannchen here with the Houston Sierra Club, and we'd like to thank the Region H water Planning Group for this opportunity to comment. And also for the consultants, a lot of these comments are -- come from a December letter that we submitted to the Region H water Planning Group that kind of got lost in the controversy over a couple of dams and so if the page numbers aren't quite right and synced up with some of the changes that were made, keep that in mind.

First of all, the Sierra Club wants to thank the water Planning Group for excluding those two proposed dams from this 2011 plan. And the only other comment we want to make on that is we hope in the future since the proponents of those dams suggested they may be back that you do not accept those dams in the plan because from our perspective they are not needed.

MR. BARTOS: Brandt, those just to clarify, those were the dams proposed in Montgomery County.

MR. MANNCHEN: Right. They have different names, Sam Houston Dam and I call it the Little Lake Creek Dam and another one is called the Lone Star Dam and I call it the Upper Lake Creek Dam, so whatever name you want to choose.

The Sierra Club supports the retention of the eight existing recommended ecologically unique stream segments and I'm not going to name those. They were up in the presentation. We also want to suggest, as we did before this plan was approved, that there are four other stream segments that should be added and we request they be added. They are all in Sam Houston National Forest and only talking about the federal land and not private land that these streams flow through and they are Caney Creek, Little Lake Creek, Winters Bayou and the west fork of the San Jacinto River and from our perspective -- San Jacinto River. And from our perspective we were disappointed in the consultant's assessment because we took the criteria that the Water Development Board developed and we matched it with these streams and they work out quite well from our perspective. So we would like the consultants to go back and look at this document and what we have said about each one of these proposed streams.

In addition, we have submitted a letter to Texas Parks & Wildlife Department suggesting that perhaps we need to update the analysis of stream segments in Region H so that we can perhaps -- if these don't get approved in 2011, then the next iteration will have new analysis from Parks & Wildlife that will look at the unique stream segment criteria and certain stream segments.

Also the Sierra Club supports freshwater flows for the optimal year-round habitat for protection of rivers and streams in Galveston Bay and other bays and estuaries. Although this is a little off subject, we support the science-based environmental flow regime for the Trinity River, San Jacinto River and Galveston Bay and the freshwater inflow recommendations for Galveston Bay as supported by a majority eight members of the BBEST.

But the Sierra Club does have some concerns and I think Jason brought up -- showed a graph and seemed to show that we're going to get enough water in Galveston Bay or not much different than what we have presently as we go to 2060 but there will be a massive shift where the water comes into Galveston Bay.

Currently the Trinity River brings in most of the water, and as we go to reuse and other technologies, most of that water is going to come into the San Jacinto River. And, in fact, a report on freshwater inflows by the Region H Water Planning Group stated that the shift could be 25 to 49 percent, which is very significant. And this may affect critical wetlands in the Trinity River delta, and Trinity Bay which is very important for oyster production. So from our standpoint, that change of where the water comes in is very much of concern, and we would hope Region H would put more analysis in looking at that.

Although it's a unique reservoir site and is not proposed in this plan to be developed, we're still very concerned about the Bedias Reservoir because of the impacts it would have on the west fork of the San Jacinto River in Sam Houston National Forest and those really important bottomland hardwoods and we wanted to make that statement.

Nothing about climate change is in this report, and we'd like to encourage Region H to recommend to the Texas Water Development Board that either -- that they should -- with the assistance of federal and state agencies like Parks and Wildlife or Fish and Wildlife conduct an analysis with regard to climate change. And in our comments we show some elements that could be in that kind of analysis.

In Chapter 4 we talk about population. And we again want to express our concern that in many respects the population projections are taken as gospel as what will happen. And then we plan for those and, no surprise, we often meet those projections. But what we don't have as a region and what Texas Water Development Board hasn't done and the regions haven't done is we as a region must begin developing and articulating our regional population and development goals or de facto growth policy will continue to reflect past trends or the wishes of those who are best able to express their views.

In our mind, each watershed in Region H has a carrying capacity. And we are very concerned that, for instance, the San Jacinto River basin in the Houston area, that we've exceeded the carrying capacity with regard to what our natural resources can do. So we want to encourage Region H to feedback to Texas Water Development Board and say we need a dialogue with our citizens about what it is they want in the future with regard to their quality of life and their population and their development. Because right now they are getting what we assume is going to happen and that may not be what they want.

In addition, I wanted to suggest that when we talk about inner basin transfers, one of these strategies deals with bringing water from the Trinity River all the way over to Lake Conroe. And again we are very concerned about the impacts that will have on Sam Houston National Forest, west fork of the San Jacinto River and those important bottomland hardwoods. So again we are -- that particular strategy could be very environmentally harmful.

On industrial water conservation, it was a really neat meeting in Brazoria County about a month or two months ago where a bunch of different perspectives spoke before the county commissioners. And Dow Chemical talked about some of the things that they were looking at to do differently because of some -- a drought situation that occurred. We think it will be helpful, whether it's on a voluntary basis or a mandatory basis, if large industrial concerns like municipalities right now and other utility groups who go to the Water Development Board for assistance could submit a water conservation plan and say this is kind of the way we're looking in the future of how we're going to use water and how we're going to save water. And we think that will be very helpful for those large industrial concerns to think more about that and provide that information to the Region H and to the utilities that deal with those large concerns.

One of the particular water management strategies -- some might call it the mother load is the east Texas water transfer, basically taking water from the Sabine and Neches River and bringing it all the way over to our area. And again we want to encourage Region H to look at that very carefully because of the large potential environmental impacts and particularly to the Big Thicket National Preserve, and we're concerned about those impacts.

Also regarding Luce Bayou interbasin transfer which is slowly moving on up, one of the concerns we have is what effect that may have as well as reuse on the Trinity River National Wildlife Refuge. And also again on those wetlands that are in the lower Trinity River and the delta and also oyster beds. So that is of a concern and we would -- we think that needs to be taken into account.

Also concerning Millican Dam as a water management strategy, from our standpoint, no one has talked about the effects Millican, Allens Creek, and the Little River Dam or Off Channel Dam will have altogether on the Brazos River and the ecosystems that depend on the Brazos River. So that's kind of a cumulative effect situation, and we're concerned about the San Bernard National Wildlife Refuge and the Columbia bottomlands and so we're real concerned about Millican and whether that's really a good strategy.

Finally -- almost finally -- finally, with regard to some of the recommendations to the -- that the Region H wants to make to the Texas Water Development Board and the legislature, we're concerned about the infrastructure financing recommendations that are discussed on 8-31 and 8-32 dealing with regionalization. It talks about contracting with privately owned facilities and a variety of things. And we want to remind the Region H Water Planning Group that this type of privatization of public resources and responsibilities can result in a public resource water becoming a commodity that private entities control and earn money off of. We're concerned that this could result in the use of financial instruments that are shaky and ill-advised as the ones that have brought on our current recession. Why should the public give up its control of its natural resource water while at the same time subsidizing a private for profit entity to make profits from this public resource? Quite frequently the profit mode overrides the public interest, and so we're real concerned about that kind of recommendation and would suggest Region H look more closely at that and whether maybe the recommendation is worse than the condition. Thank you very much.

MR. BARTOS: Thank you, Brandt. Is there anyone else that would like to make any public comment? If not, I will open it up -- keep in mind that any comments that you make you still can make them in writing. And any comments or questions and that type of thing is going to be reported back to the full Region H board and certainly something that we will at least take into consideration. So if anyone has any further public comment or questions and answers at this time, I urge you to -- this is the time. Paul, you have anything?

MS. CALLAWAY: He's wanting one of these primo seats up here.

MR. WYNNE: If you will start over since I missed it.

MR. BARTOS: We will. Any questions, comments from anybody? Anybody -- I'm sorry. Jim. Come on to the microphone maybe for the reporter's sake. By the way, there is some technical language in Brandt's and we'll help you with that. One of the things was BBEST, B-B-E-S-T.

MR. WYNNE: I'm Jim Wynne and I'm with the Houston Audubon Society, and I just took note in the beginning of your presentation you talked about conservation strategies and you listed three areas of industrial, irrigation and municipal; and I was just hoping you could talk in a little more detail about that. Perhaps that's all in the master plan.

MR. AFINOWICZ: That is included in the plan and definitely in much more detail than I can speak to just this evening. There are specific strategy memos within the Chapter 4 that include some details on each of those strategies.

To give you little more background, Region H has a pretty good track record with including municipal conservation strategies and irrigation conservation strategies. One of the new ones though that we up to this point haven't had much of an opportunity to get a handle on is industrial conservation just because that information is usually hard to get out of private industry.

I'm happy to say in this plan this was some information that could be used to actually develop that a little bit more as a strategy even though it's in a limited sense at this point. But we'd be happy to get you the specific sections in the plan that would go through all the details on that.

MR. WYNNE: I'd appreciate it.

MR. BARTOS: Jason if I could ask a follow-up on that. How does our municipal water conservation in our region compare with conservation in other parts of the state?

MR. AFINOWICZ: I would say our conservation is fairly conservative compared to some -- some of the conservation that's been used in the other areas and part of that is by design. One reason for that that the Planning Group has expressed in the past is that betting on high levels of conservation can possibly create a situation in the future where proper planning hasn't been done for strategies and if that conservation doesn't come to fruition, there may not be an opportunity to catch up and create a strategy to meet those demands by alternative means and with that the plan recommends a level conservation for municipal use somewhere between about 5.5 percent and 7 percent. Just to give an idea of what sort of conservation could be realized.

MR. BARTOS: What does that mean? A reduction of 5 to 7 percent?

MR. AFINOWICZ: That's correct. That's a reduction in total municipal demand.

MR. BARTOS: So how does that then compare -- you said it was conservative, but how does it compare to the other parts of the state? How does our conservation fit in? Do you have any way to gauge that?

MR. AFINOWICZ: We do, and there is definitely numbers from other regions. I can't think off the top of my head.

MR. BARTOS: I'm sorry.

MS. CALLAWAY: Can you remember Region C?

MR. BARTOS: All right. Any other questions or comments from anyone? Yes, sir.

MR. ALBERS: I would just say when you talk about conservation --

MR. BARTOS: Please state your name.

MR. ALBERS: Barnell Albers. When you're talking about conservation plans, I had the opportunity to work in California. I'm not saying we want to mimic them, but I know they have a lot of material about their conservation plans. It might be something to look forward to and find out what they did and what they thought was successful and not successful. And I know that's true in both the southern area for LAEWP and in this northern area just this past year, so I think it's worthwhile to look at other areas. We haven't had the problem that that area has had, not that we mimic those. I'm not suggesting that at all, but I think looking at outside the state is worthwhile.

MR. NELSON: Since I drove all the way.

MS. CALLAWAY: Introduce yourself.

MR. NELSON: My name is Paul Nelson. I work for the North Harris County Regional Water Authority and represent water authorities as an alternate to Jimmy Schindewolf.

I guess everybody knows there is a stakeholders group that's doing conservation across the state as a result of the Senate bill prior, and I think one of their biggest issues as I've watched them is that there are too many ways out there that people can calculate the per capita consumption, and that's one of their goals I think is to try to -- when you start looking at San Antonio versus Dallas versus Houston, that we all get on the same page and start using the same method so when we do speak about a per capita usage, that we're talking the same language. So that is one step in trying to consolidate.

And to follow up your question, when you say 5.5 percent, the concern is that's over this planning period? It's over a 20 year period? What period of time do we --

MR. AFINOWICZ: That is realized almost immediately. So that level of conservation represents 5.5 percent reduction in the 2010 demand, the 2020 demand compared to what it would normally be and that's on top of some conservation that's built in by the Water Development Board in their projections.

MR. NELSON: When you say conservative, is that number down from prior?

MR. AFINOWICZ: That number is slightly down from what was shown in the 2006 plan. I think it's low compared to some other regions, but it's only slightly lower than the 2006 plan. That was related mostly to some more information that came in along the way from the conservation plans.

MR. NELSON: Thank you.

MR. BARTOS: Okay, any other comments, questions, anything?

Okay, anything? Anybody else? Temple, do you have anything to add?

MS. MCKINNON: No.

MR. BARTOS: Okay. Well, I thank everybody again for coming. I hope that you will follow up and leave public comments so that the regional group can look at them and pay attention to what's going on in water planning these days. It's an exciting time and a lot is happening. So thank you very much. We'll adjourn the meeting.

(Hearing adjourned at 7:20 p.m.)

Appendix 10F

Public Hearing Materials
April 1, 2010

This Page Intentionally
Left Blank

Contents – April 1, 2010 Public Meeting

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-7111

TO:

- Each mayor of a municipality with a population of 1,000 or more or which is a county seat that is located in whole or in part in the Region H water planning area;
- Each county judge of a county located in whole or in part in the Region H water planning area;
- Each special or general law district or river authority with responsibility to manage or supply water in the Region H water planning area based upon lists of such water districts and river authorities obtained from Texas Commission on Environmental Quality;
- Each retail public utility, defined as a community water system, that serves any part of the Region H water planning area or receives water from the Region H water planning area based upon lists of such entities obtained from Texas Commission on Environmental Quality; and
- Each holder of record of a water right for the use of surface water the diversion of which occurs in the Region H water planning area based upon lists of such water rights holders obtained from Texas Commission on Environmental Quality.

RE: **Public Notice of an *Initially Prepared 2011 Region H Water Plan (IPP)***

DATE: February 26, 2010

PUBLIC NOTICE

To All Interested Parties:

The Region H Water Planning Group area includes all or part of the following counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker, and Waller.

Notice is hereby given that the Region H Water Planning Group (RHWPG) is requesting public review and comment on an Initially Prepared 2011Region H Water Plan (the IPP).

A summary of the content of the Draft Initially Prepared Plan: The *Initially Prepared Plan (IPP)* updates the 2006 Region H Water Plan that was included in the 2007 State Water Plan prepared by the Texas Water Development Board (TWDB). The IPP addresses the following topics:

- Water needs based on projected population and water demand
- Water supplies available to meet projected water demand
- Water management strategies for meeting any identified water shortages
- Socioeconomic impact of not addressing shortages
- Impacts of Management Strategies on Water Quality and Agricultural Areas
- Water Conservation and Drought Management

- Protection of Water Resources and Natural Resources
- Proposed Unique Stream Segments
- Proposed Unique Reservoir Sites
- Regulatory, Administrative and Legislative Recommendations

Public Comment: Public hearings to receive public comment on the IPP will be held at the following dates and locations:

> **March 30, 6:30 p.m**.
> Houston-Galveston Area Council
> 3555 Timmons, 2nd Floor, Room A
> Houston, Texas 77027
>
> **April 1, 6:30 p.m**.
> Truman Kimbro Convention Center
> 111 West Trinity
> Madisonville, Texas 77864
>
> **April 7, 10 a.m**.
> Lone Star Convention Center
> 9055 FM 1484
> Conroe, Texas 77303

The RHWPG will accept written comments until 5:00 p.m. June 8, 2010. Written comments should be provided to:

> Hon. Mark Evans
> Chair, RHWPG
> c/o San Jacinto River Authority
> P.O. Box 329
> Conroe, Texas 77305-0329
>
> J. Kevin Ward
> Executive Administrator
> Texas Water Development Board
> P.O. Box 13231
> Austin, Texas 78711-3231

Questions or requests for additional information may be submitted to: Reed Eichelberger, General Manager, San Jacinto River Authority, P.O. Box 329, Conroe, TX 77305-0329, telephone 936-588-7111. The San Jacinto River Authority is the Administrator for the RHWPG.

A copy of the Initially Prepared Plan for 2011 is available at the County Clerk's Office and at a depository library in each county in Region H. A list of depositories is attached. A copy also is available on the RHWPG website at www.regionhwater.org and on the regional planning section of the TWDB website at www.twdb.state.tx.us/wrpi/rwp/rwp.htm.

DEPOSITORY LIBRARIES IN REGION H

AUSTIN COUNTY
Gordon Library
917 Circle Drive
Sealy, TX 77474

BRAZORIA COUNTY
Angleton Public Library
401 East Cedar
Angleton, TX 77515

CHAMBERS COUNTY
Chambers County Library
– Main Branch
202 Cummings
Anahuac, TX 77514

FORT BEND COUNTY
George Memorial Library
1001 Golfview
Richmond, TX 77469

GALVESTON COUNTY
Rosenberg Library
2310 Sealy
Galveston, TX 77550

HARRIS COUNTY
Houston Public Library - Central
1st Floor, Bibliographic Information Center
500 McKinney
Houston, TX 77002

LEON COUNTY
Ward Memorial Library
207 East St. Mary's
Centerville, TX 75833

LIBERTY COUNTY
Sam Houston Regional Library
and Research Center
650 FM1011
Liberty, TX 77575

MADISON COUNTY
Madison County Library
605 South May
Madisonville, TX 77864

MONTGOMERY COUNTY
Montgomery County Central Library
104 Interstate 45 North
Conroe, TX 77301

POLK COUNTY
Murphy Memorial Library
601 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
Coldspring Area Public Library
14221 State Highway 150 West
Coldspring, TX 77331

TRINITY COUNTY
Blanche K. Werner Library
203 Prospect Drive
Trinity, TX 75862

WALKER COUNTY
Huntsville Public Library
1216 – 14th Street
Huntsville, TX 77340

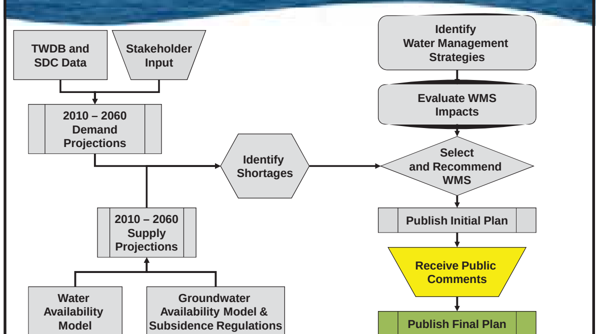
WALLER COUNTY
Waller County Library -
Brookshire/Pattison
3815 Sixth Street
Brookshire, TX 77423

Region H Water Planning Group
Public Hearing for
2011 Initially Prepared Plan
April 1, 2010
Truman Kimbro Center, Madisonville

Regional Water Plan Overview

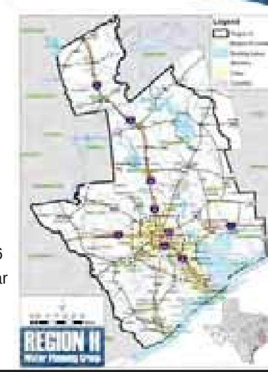
- Region H Overview
- Population and Water Demand Projections
- Water Supply Estimates
- Water Management Strategies
- Protection of Water Resources
- Unique Stream Segments & Reservoirs
- Administrative, Regulatory and Legislative Recommendations
- Infrastructure Financing Survey and Recommendations
- Special Studies

Regional Water Planning Process



Regional Water Planning

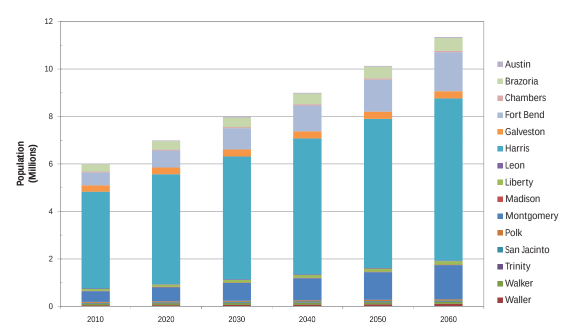
- 16 Planning Regions
- Region H
  - 15 Counties
  - 3 River Basins
  - 4 Coastal Basins
  - 2 Major Aquifers
  - 4 Minor Aquifers
- 50-year water plan (2010-2060), updated every 5 years
  - Previous Plans: 2001 and 2006
- State Water Plan published one year after final regional plans



Population and Water Demand Development

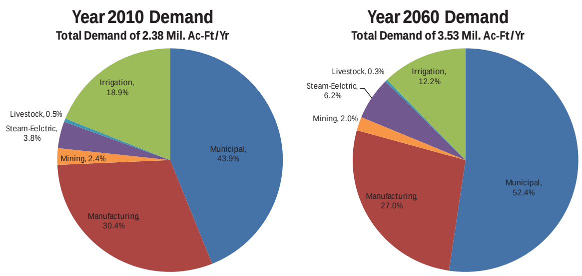
- Revision to values in the 2006 Regional Water Plan
- Updated population and associated demand with data from various sources:
  - State Data Center
  - Texas Water Development Board
  - Individual communities and water authorities
- Approved by Region H in public meetings
  - May and July, 2009
- Approved by Texas Water Development Board in October, 2009

Population Growth



Demand Comparison – 2010 and 2060

REGION H Water Planning Group



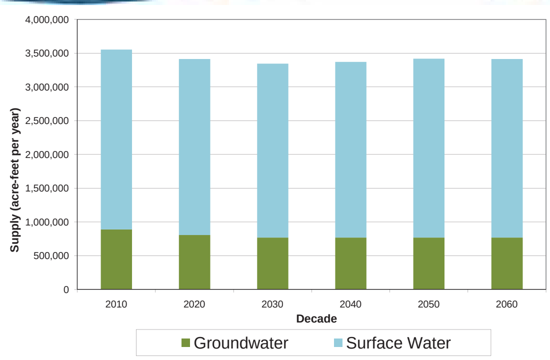
Available Water Supplies

REGION H Water Planning Group

- Supplies determined by
  - Surface Water Availability Model (drought of record)
  - Groundwater Availability Model or local regulations
- Total Existing Supplies
  - 3,561,017 acre-feet per year
  - 75% surface water
  - 25% groundwater
- 2060 Available Supplies
  - 3,415,860 acre-feet per year
  - Groundwater use reduced by regulation
  - Reservoir storage reduced by sedimentation

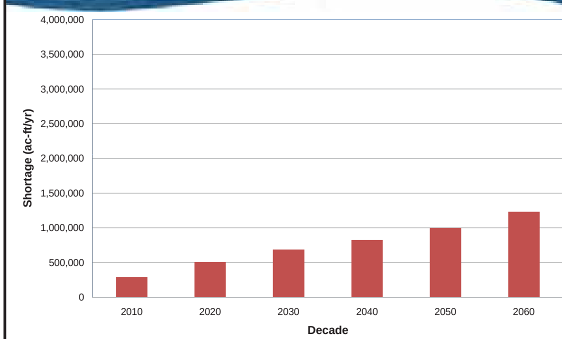
Existing and Projected Water Supplies

REGION H Water Planning Group



Projected Supply Deficit

REGION H Water Planning Group



Selected Management Strategies

REGION H Water Planning Group

- Conservation Strategies
  - Industrial
  - Irrigation
  - Municipal
- Contractual Strategies
  - Contracts to water users (WUGs)
  - Contracts among water providers (WWPs)
- Groundwater Strategies
  - Expanded Use of Groundwater
  - Interim Groundwater Use
  - New Groundwater Wells for Livestock

Selected Management Strategies

REGION H Water Planning Group

- Groundwater Reduction Plans
  - City of Houston
  - North Harris County Regional Water Authority
  - Others
- Reservoir Strategies
  - Allen's Creek Reservoir
  - Gulf Coast Water Authority Off-Channel Reservoir
  - Millican Reservoir
- Permit Strategies
  - Brazos River Authority System Operations
  - Houston Bayous Permit

Selected Management Strategies

- Reuse Strategies
  - Houston Indirect Wastewater Reuse
  - Wastewater Reclamation for Industry
  - Wastewater Reclamation for Municipal Irrigation
  - Others
- Infrastructure Strategies
  - Luce Bayou Transfer
  - COH, NHCRWA, WHCRWA, CHCRWA, and NFBWA Transmission and Distribution Systems
  - CLCND West Chambers County System
  - Others

Selected Management Strategies

- Other Strategies
  - Brazoria County Interruptible Supplies
  - Brazos Saltwater Barrier

Major Water Management Strategies

Major WMS	Sponsor	Selected Strategy	Projected Start Decade	2010	2020	2030	2040	2050	2060
				Total Allocated (ac-ft/yr)					
Reservoirs									
Allens Creek Reservoir	BRA / Houston	Y	2020	-	76,441	93,688	97,954	99,580	99,650
GCWA Off-Channel Reservoir	GCWA	Y	2030	-	-	39,500	39,500	39,500	39,500
Millican Reservoir (Panther Creek Dam)	BRA	Y	2040	-	-	-	11,627	58,351	120,994
Contractual Strategies									
TRA to Houston Contract	TRA / Houston	Y	2030	-	-	116,738	123,524	123,524	123,524
TRA to SJRA contract	TRA / SJRA	Y	2040	-	-	-	7,935	39,096	76,476
Reclamation/Reuse									
Houston Indirect Wastewater Reuse	Houston	Y	2040	-	-	-	66,420	114,679	128,801
NHCRWA Indirect Wastewater Reuse	NHCRWA	Y	2040	-	-	-	7,300	16,300	16,300
Wastewater Reclamation for Industry	Houston, Manufacturing	Y	2060	-	-	-	-	-	67,200
Permit Strategies / Other									
Brazoria Interruptible Supplies for Irrigation	GCWA	Y	2010	104,977	86,759	64,000	64,000	64,000	64,000
BRA System Operations Permit	BRA	Y	2020	-	6,621	18,870	25,350	25,350	25,350
Interim Strategies	NA	Y	2010	45,512	-	-	-	-	-
Total				**150,489**	**169,821**	**332,796**	**443,610**	**580,380**	**761,795**

Protection of Water Resources

- Water Conservation
  - Recommended as the first strategy
  - Applied to meet projected shortages
- Strategy Selection Process
  - Yield and environmental impacts were considered with the unit cost of water
- Existing Supplies
  - Utilized prior to recommending new water supply projects
- Reuse
  - Included in Fort Bend, Harris County and Montgomery
  - Recommended in lieu of additional imports/reservoirs

Unique Stream Segments

- Eight stream segments were selected in 2006 and adopted by Texas Legislature:
  - Armand Bayou
  - Austin Bayou
  - Bastrop Bayou
  - Big Creek (Fort Bend)
  - Big Creek (San Jacinto)
  - Cedar Lake Creek
  - Menard Creek
  - Oyster Bayou
- 2011 Regional Water Plan retains the designations for these sites

Unique Stream Segments

Unique Reservoir Sites

- 2011 Regional Water Plan includes five Unique Reservoir Sites
  - Four already designated
    - Allens Creek Reservoir *– 2011 Selected Strategy*
    - Little River Reservoir
    - Little River Off-Channel Reservoir
    - Bedias Reservoir
  - One recommended for designation
    - Millican Reservoir *– 2011 Selected Strategy*

Unique Reservoir Sites

Designated Sites

- Allens Creek Reservoir
  - Strategy in 2001, 2006, and ***2011*** RWPs
  - Austin County
- Little River Reservoir
  - Strategy in 2001 RWP
  - Milam County
- Little River Off-Channel
  - Strategy in 2006 RWP
  - Milam County
- Bedias Reservoir
  - Strategy in 2001 RWP
  - Grimes, Madison, and Walker Counties

Unique Reservoir Sites

Millican Reservoir

- Not yet designated by Texas Legislature
- Recommended in 2011 Region H Plan
- Location:
  - Primarily Brazos, Grimes, and Madison Counties
  - Located on Navasota River
- Yield: 194,500 afy
- Capital Cost:
  - $1,159,907,000

Policy Recommendations

- Retained 15 Recommendations from 2006 Plan
  - 3 Administrative and Regulatory Recommendations
  - 12 Legislative Recommendations
- One New Legislative Recommendation
  - *Direct the State Demographer's Office to explore the potential changes in population distribution made possible by rapid advancements in information technology.*

Water Infrastructure Financing

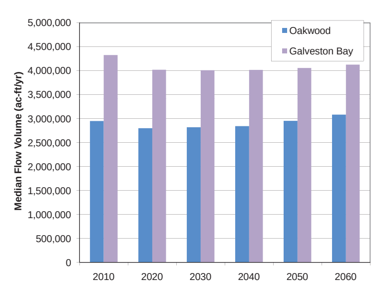
Infrastructure Funding Requirements

- Capital Costs for the 2011 Region H Water Plan
  - Estimated at $12.9 Billion (2008 Dollars)
- Water Infrastructure Financing (WIF) Survey
  - 2011 Survey will utilize TWDB Web based tool
  - Objectives:
    - Determine number of entities with finance needs
    - Identify infrastructure costs that cannot be financed locally
    - Summarize each WIF project and location in Plan

Special Studies in the 2011 Plan

Impacts of 2006 Strategies to Galveston Bay

- Modeled Impacts Over Time (2010 – 2060)
- Considered Upstream Impacts
- Near-term reductions in flow offset by higher return flows in long-term
- Mitigate increased water usage in later decades



Special Studies in the 2011 Plan

REGION H Water Planning Group

Water Conservation

- Conservation Survey
  - Included municipal, industrial and commercial conservation
  - Additional conservation plans obtained from TWDB
- Conservation Management Strategies
  - No change to Irrigation conservation strategies from 2006 RWP
  - WUG specific strategies where applicable
  - 3-tiered municipal strategy based on WUG size for other municipal WUGs
  - Conservation used to address over 200 WUG shortages

Public Comment on the IPP

REGION H Water Planning Group

- IPP Available:
  - *http://www.regionhwater.org*
  - *County Clerk's Office in each county*
  - *Depository library in each county*
- Public Hearings
  - Tuesday, March 30th @ 6:30 PM – Houston
    - Houston-Galveston Area Council
  - Thursday April 1st @ 6:30 PM– Madisonville
    - Truman Kimbro Convention Center
  - Wednesday, April 7th @ 10:00 AM – Conroe
    - Lone Star Convention and Expo Center

Public Comment on the IPP

REGION H Water Planning Group

- Taking comments through:
  - *5:00 PM June 8, 2010*
- Please submit comments to:
  - Hon. Mark Evans
Chair, Region H Water Planning Group
c/o San Jacinto River Authority
P.O. Box 329
Conroe, TX 77305-0329
  - J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

REGION H Water Planning Group

Questions and Comments

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

BUGET QUESTION
COST / AC.FT.
ACQUISITION COSTS

NAME: ROBERT AVERY JR

AFFILIATION: LANDOWNER

ADDRESS: 14695 STATE HWY 30, C.S. TX 77845
City State Zip

979-324-1746 | | RAVERYJR@YAHOO.COM
Telephone Fax E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

Reservoirs

NAME: Daiquiri Beebe

AFFILIATION:

ADDRESS: 25521 CR 131 Bedias 77831
City State Zip

Telephone Fax E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

Our Land & Home

NAME: Brenda Bender

AFFILIATION: B Ranch

ADDRESS: 1269 Town & Country Ln Madisonville, TX 77864

City State Zip

936-348-9062 | |

Telephone Fax E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☒ I would like to speak on the following topics:

Panther Creek
Bundic

NAME: Cathy Cox

AFFILIATION: Guardians of the Navasota

ADDRESS: 12464 Long Trussel Bryan Tx 77808

City State Zip

281-703-8205 | | Cathy@Coxfamilyfarm.com

Telephone Fax E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

Panther Creek
Bundic

NAME: Leonard Cox

AFFILIATION: Guardians of the Navasota River

ADDRESS: Bryan (City) Tx (State) 77808 (Zip)

979-589-1075 (Telephone) | (Fax) | (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☐ I would like to speak on the following topics:

FRED DAVIS
DOWNSTREAM IMPACT
ENVIORNMENTAL IMPACT

NAME:

AFFILIATION:

ADDRESS: (City) (State) (Zip)

(Telephone) | (Fax) | (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

Panther Creek

Bundle

NAME: Mark Dudley

AFFILIATION: Guardians of the Navasota

ADDRESS:

City | State | Zip

~~979-[illegible]~~

Telephone | Fax | E-Mail

979-399-6185

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

Eliminating Bedias as a Viable Alternative Strategy

NAME: Gerald Jozwiak

AFFILIATION: Citizen

ADDRESS: 1940 Derby Madisonville 77864

City | State | Zip

936-348-1747

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☐ I would like to speak on the following topics: Just Q+A (Spoke)

NAME: Bill Knotts

AFFILIATION:

ADDRESS: 2227 Robinson Way Huntsville Tx 77340
City State Zip

936 295 3439
Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:
Flooding Navasota

NAME: John Knotts

AFFILIATION: Land owner / son of Land owner

ADDRESS: Huntsville TX. 77340
City State Zip

Telephone | Fax | E-Mail JKartist45@yahoo.com

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - April 1, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

QUESTION ABOUT FULL POOL ELEVATION AND EMERGENCY SPILLWAY ELEVATION.

NAME: JOHN MELVIN

AFFILIATION: BVGCRA P.O. BOX 4713

ADDRESS: BRYAN (City) TX (State) 77805 (Zip)

979-575-4335 (Telephone) | 979-778-0044 (Fax) | JMELVIN@BVGCRA.COM (E-Mail)

REGION H WATER PLANNING GROUP

PUBLIC HEARING

THURSDAY, APRIL 1, 2010

TRUMAN KIMBRO CONVENTION CENTER

111 WEST TRINITY

MADISONVILLE, TEXAS

6:30 P.M.

Transcript prepared by:

The Captioning Company

P. O. Box 441179

Houston, Texas 77244-1179

(281)684-8973 (cell)

(281)347-2881 (fax)

captioningcompany@comcast.net

MR. EVANS: Good evening to everyone. As a way of introduction, my name is Mark Evans, I'm the county judge over in Trinity County, but I also serve as chairman of the Region H Water Planning Group. I would like to recognize other members of our Water Planning Group that are here. Steve Tyler is here, and Bill Teer is here, John Howard and then the Madison County judge Art Henson is here as well and certainly thank y'all for all being here.

Also we have Temple McKinnon with the Water Development Board is here with us as well and hopefully I haven't missed any Water Planning Group members.

The way we're going to proceed this evening is we're going to have a presentation on our draft Region H Water Plan. After that we will take public comments from everyone that wishes to enter their comments about the plan into our record. And then certainly as long as time allows, we'll go as late as we have to because I never know where that would run to, but we will at least stay as long as they are serving crawfish at the restaurant next door. Then we'll have questions and answers and we'll have as many of your questions answered as we possibly can.

At this time I'm going to call on Jason Afinowicz who is our consultant on this, and he'll go through the plan. Jason...

MR. AFINOWICZ: And thank you everyone for coming out tonight. Just to give you a little bit of a comparison here, two nights ago in Houston we had a group of maybe a dozen people. This is a much better showing. So y'all are doing a much better job than Houston did.

The public involvement part of the Region H -- regional planning process in general across the whole state is a key part of what makes a planning process work. It's a grassroots approach, bringing public interest and comment in developing a plan which will eventually lead to a state water plan. I appreciate all y'all being here tonight.

Just to give you an idea of what we're going to talk about, first is an overview of what Region H is, a little bit of talk about population water demand projections, the water supplies and then the strategies that are considered to meet those shortages that were identified. A little bit of talk about protection of water resources that are included in the plan, discussion of unique stream segments and reservoir sites, regulatory and legislative recommendations which are also included as part of the plan and also how all of this gets funded as part of the funding process. And a little discussion about special studies that were included in the plan to give you an idea of what's in the full document itself.

This illustration kind of gives you an idea of how the planning process works at a very high level view. Up at the top you see some consideration for the development of future water demands out through the year 2060. And down below a look at what available water supplies will be in the future. Once those two steps are done, the shortages in between those that delta is identified, from there management strategies are selected and an initial plan is prepared and that's what you've seen on the website if you've been able to visit there at Region H water.

And then at that point, this is a great opportunity to receive public comments on that plan and take that into consideration before the conclusion of the planning process and the development of the final plan.

This is a map of Region H here. We're way up at the top here tonight. Region H consists of 15 counties and this includes three river basins and two major aquifers. The plan itself is created to figure out what the needs are for water resources from the year 2010 to 2060, a very wide planning horizon, but that's the horizon you've got to look at to consider what needs are in the future and to start planning now. And then once this plan is turned into the state, eventually the state water plan will follow one year later.

Starting with population water demands, this is really the basis for everything, knowing what the needs are for water in the long term. Initially, this started with the use of numbers from the 2006 water plan that was just five years ago. There was no census data available obviously since we're just turning that stuff in today. There was no information that could really be used to directly update that, but the best information available from the State Data Center, Texas Water Development Board and actually the communities and water systems themselves were all compiled to update the needs into the future.

These were considered in public meetings by the Region H Planning Group and then approved in May and July of last year. And then this was later approved by the Water Development Board later in the year.

MR. EVANS: Sorry about this, but some of the folks are having a hard time hearing you.

MR. AFINOWICZ: Sorry about that. They don't always make these things for tall people. I've just got to try. How is that? A little lower. We'll try that.

And that population data, once we start taking a look at it, kind of shows an upward trend as you see here starting at around maybe 6 million people in the year 2010 growing to as much as 11 million out in the year 2060. A lot of that growth that you see is in Harris County but an awful lot of that is also in the surrounding counties as growth in the region starts to spread out and covers a much larger area than it traditionally did.

To translate into a water demand -- the current demand is approximately 2.38 million acre-feet per year. And you kind of see the portions there of how that's split up. In the year 2060 this will increase by about 50 percent to over 3.5 million acre-feet per year and these are the additional needs that have to be considered and some sort of strategy devised for dealing with future demand.

Water supplies were determined from the best available science. This included water availability modeling, known as the WAMS, devised by TCEQ for determining surface water availability and also input on groundwater from local GCD's and also subsidence districts in Harris and Galveston and Fort Bend and so forth.

This translated to a total existing supply of just over 3.5 million acre-feet per year, which remember is pretty close to that 2060 demand number. The 2060 supplies, however, do decrease over time because of sedimentation of reservoirs, reduced yield from surface water supplies and also regulation of groundwater. This kind of gives you an idea of those supplies there. You see there is a much larger portion of surface water within Region H than groundwater.

Now, all of this sounds great as in it's about that 3.5 million acre-foot amount except the water is not always where it needs to be and it's not always in a form that's usable. This shows an illustration of how shortages are projected to grow over time out to 2060 where shortages are anticipated to be about 1.2 million acre-feet per year.

This is where strategies come in. Once that deficit has been identified, strategies can then be applied to figure out how all those shortages are going to be met. These strategies -- conservation, contracts, groundwater -- are some of the first ones that the Region H Planning Group looked at. Conservation has always been a primary focus of the group, and in this plan there has been industrial, irrigation, and municipal conservation included into the plan to meet some of those future demands as much as possible. Also contractual strategies have been implemented which basically represent the use of existing water that can be contracted to people that's already there without the development of a new supply. Groundwater strategies have also been used wherever possible.

Beyond this, the groundwater reduction plans which are being implemented by water providers in the Houston area have been included here to represent the surface water conversion that they are performing at this point.

There are reservoir strategies recommended, including Allens Creek Reservoir in Austin County. There is a small reservoir for the Gulf Coast Water Authority that's recommended in Brazoria County to convert some of their interruptible supply to a firm yield, something that can be relied on all the time. And also Millican Reservoir is recommended as a major strategy for the Lower Brazos Basin and those needs.

There are also permit strategies considered. One of those is the Brazos River Authority system operations permit which is a way to more effectively use water out of the existing system without new infrastructure. Reuse has been implemented to a large degree and this is from small systems, direct reuse systems, something going directly from the wastewater treatment plant to irrigation. Or also larger indirect reuse strategies, wastewater reclamation for industry and municipal irrigation as well.

There are infrastructure strategies in this plan, and one of those being the Luce Bayou transfer which has been included in the Region H plan since the beginning in 2001. And this is actually moving forward at this point. Also there is distribution infrastructure for the City of Houston, the regional water authorities and others as well as Chambers-Liberty County's Navigation District in Chambers County.

Other strategies also include interruptible supplies for irrigation in Brazoria County. This is a strategy that mirrors the way water is currently used in that county and also the Brazos Saltwater Barrier which is intended to increase water quality in the lower basin.

This kind of gives you a quick illustration of some of the more major strategies. You'll see some of these are much more significant than others, there is also a matter of timing, too. Strategies like the interruptible supplies for irrigation in Brazoria County begins as early as 2010, right now. However, some others, like Millican Reservoir, begin in 2040 or some of the reuse strategies out in 2060 will take some time to implement and will be used later on in time.

The whole plan was assembled with an emphasis on the protection of water resources for the entire state, including the use of water conservation wherever possible, the strategy selection process itself, did not just consider the cost of water, but what the environmental impacts would be and what the impacts were on other water resources. Existing supplies were utilized as much as possible to prevent developing new strategies where there didn't need to be one and also reuse was included as much as possible.

The planning group has an opportunity to nominate stream segments as unique stream segments. These are sites that have very unique characteristics for one reason or another. There were eight that were selected in the 2006 Water Plan. These have been adopted by the state legislature and these same nominations and recommendations have been included in this 2011 plan.

This map gives you an idea of the locations of those. Also kind of the opposite of unique stream segments is unique reservoir sites. And there were four that were already designated in previous plans, one of these being Allens Creek, which is selected as a strategy in this plan, but also Little River Reservoir which was a strategy in the 2001 plan and was not a strategy in the 2006 plan or the 2011 plan. Little River Off Channel which was selected as a strategy in 2006 also isn't selected as a strategy in 2011, and Bedias Creek which was selected as a strategy in 2001 but hasn't been implemented as a strategy ever since.

One new recommendation for this planning round is Millican Reservoir which has been, like I said, recommended for meeting demands in the Lower Brazos Basin. Again, this gives you an idea of those reservoir sites. A little bit more on Millican -- it has not yet been designated by the state as a unique reservoir site. It is recommended as a strategy in this 2011 plan though.

The planning group also has the opportunity to make several recommendations, and 15 recommendations were retained from the 2006 plan. These are recommendations to the legislature and regulatory offices of the state. One new recommendation was also considered to direct the state demographer to consider not just past trends in population growth, that population growth will always occur where it has in the past but also consider the impacts of technology and the ability for smaller rural areas to grow at larger rates than are currently anticipated because of telecommuting and other impacts.

Water infrastructure financing is a section in the plan that considers how is all this going to be paid for. It's a significant amount of money. And the 2011 plan -- just the capital costs for implementing the strategies identified is nearly $13 billion. To address this, the Water Development Board is intending to send a survey to water user groups, wholesale water providers that are going to be implementing strategies over the next 50 years to determine what their ability is to pay for that, if they need assistance and what sort of programs may be out there to help them.

One special study considered in the 2011 plan was a study of environmental impacts to Galveston Bay. This kind of grows on an earlier study that went on to examine what are the impacts of individual water management strategies in the year 2060.

This study actually looked at what are the impacts over time. There are significant impacts from the upper Trinity Basin and the metroplex and things going on up there that impact us in the lower basin. This study looked at what return flows were from upstream, Region C and implemented the Region H strategies over time to determine what overall impacts would be to Galveston Bay. And this figure here kind of gives you an idea of what the median flows are at two points, one of them is the Oakwood gauge on the Trinity River and the other one is the Trinity River into the Galveston Bay. And over time you see that this study shows that there is a small decrease in the near term due to strategies from Region C, but as flows increase over time, that that mitigates some of the additional use of water from Region H.

As we talked about before, water conservation has been a major part of the Region H planning process from the beginning including this plan. A conservation survey was conducted of water user groups in the region to determine what sort of conservation practices they use, what sort of savings they could expect and how that could be best molded into conservation strategies for this plan.

There were some opportunities to implement specific strategies for some of the water user groups within Region H, those demand centers, and also this provided some input for directing the way general conservation is done in the plan. And going back to the emphasis of public involvement here, as you probably know, the initially prepared plan is available on the Region H website. You see the address there. There are three public hearings that are being held. Region H is only required to do one public hearing just to cover the plan right before it's finalized and put into final form, but the planning group felt it was important for there to be three meetings held and this is one of them. This is the second of those three meetings. The third will be next week in Conroe as you see there.

The planning group will be taking comments on this plan through June 8th, 2010. And they can be submitted to the chair of the Region H Planning Group or directly to the Texas Water Development Board.

AUDIENCE MEMBER: Would you go back to that previous slide? No, the addresses.

MR. AFINOWICZ: And that concludes our part of this just to give you an overview of what's going on.

MR. EVANS: All right, thank you, Jason. At this time we're going to take public comments, and as Jason said, we are having two additional public hearings to get those public comments. So we really want to hear what you have to say.

MS. CALLAWAY: These are the people that signed up to speak.

MR. EVANS: What we're going to ask you to do if you've signed up to speak, and I call on you, if you would at all possible come forward where the reporter can hear you and get your comments on the record because we certainly want to do that. There is not an aisle over here, but if you're over here maybe you can come around here where the court reporter can see you. I think the room is such if you speak up we'll be able to hear you.

You don't think so. We're going to accommodate our reporter the best we can. So we're going to try and just have you come forward. If that doesn't work, we'll get you here at the microphone. She's nodding her head like I think we want to start at the microphone. As a judge, I know the reporter has the record, so what she says goes.

So we will start first with Robert Averyt. I hope I got that right. Averyt.

MR. AVERYT: Thank y'all. I know we're limited to three minutes. I can talk for days. I've got several concerns. I've spent quite a bit of time since last Sunday when I found out about this going over y'all's website and a bunch of the report that we looked at today. I have just all kinds of questions about your cost estimate summary. Some of the numbers I just -- I don't see how it could be done.

Land acquisition and survey, you guys have $399,218,000 for land acquisition and survey. I'm addressing the Millican. I'm sorry, the Millican Reservoir. If you divide that by 71,200 acres, that's $5,600 an acre. A lot of my neighbors that I've talked to say their land is priceless. It is to those folks. They've held it for generations and generations. I respect that. It's priceless.

My land I've owned for 15 years, and I've spent a lot of money upgrading it. Mine is not priceless, but it's not available for $5,600 an acre. I need a whole lot more than that.

Jason, one of the things I question in one of your slides, the 2010 supplies I think you guys have got a problem with one of your slides. I think your usage is a whole lot more than what you are showing your supplies to be right now. I've seen all kinds of discrepancies in the information that I've been able to get, and I'm not pointing a finger. We need more -- we need good information to where we can give you guys good public opinion.

Millican Reservoir -- I'd love to know what the designed elevation level is. Is it 263 or 274? Can anybody answer that?

MR. EVANS: What we want to do is make your comments first and then we'll come back.

MR. AVERYT: That's one of our questions. Nobody knows the elevations we're talking about.

Let's see, the projections from your water costs in the stuff that I've seen, you guys are projecting $424 per acre-foot of water that you'll be able to sell water for. Currently, Tampa Bay, Florida is desalinating water at a cost of $650 per acre-foot. This has been a rushed research project for me. My research shows, and what I have read and learned, there are estimates they'll be able to desalinate water -- the cost to desalinate water will be reduced by 20 percent in the next five years, and by 50 percent by year 2020. So that would put the cost of desalinated water way below what you guys are going to be able to sell water for, before your project even comes online. So I'm concerned about the numbers. I'm a numbers guy, an old machinist from way back. I love numbers. To me, your numbers don't work.

I'd like to know where the dam for the Millican is supposed to be located. The maps I've seen -- I've seen two different maps in some of the publications. I live in the Navasota bottom. If the levels are 263, I've got two houses that are going to have about 40 feet of water above them. I've got scuba gear, but I'm not that good with it.

Thank y'all, and I'm proud to see the turnout tonight.

[APPLAUSE]

MR. EVANS: Thank you for your comments, Mr. Averyt, the questions as well. When we get to the question time, we'll certainly have the opportunity for some of the guys up here on the front row to take a shot at your questions.

MR. AVERYT: Thank you.

MR. EVANS: Our next speaker will be Gerald Jozwiak.

MR. JOZWIAK: Good job.

MR. EVANS: Full disclosure, I did have a little help. I used some local knowledge.

MR. JOZWIAK: Thank you, Judge. Appreciate it. Yes, my name is Gerald Jozwiak, and I live in Madison County. And I have a prepared statement. I'm going to try to read a part of it and submit my letter in.

My first point I would like to make is regarding the future steam and electric demand for Madison County. The IPP shows no demand for the Madisonville power plant project. Please include this demand of 3 million gallons a day in your regional plan. If this project fails to materialize, the demand can easily be taken out in the 2016 plan. All surface water rights in our county are owned by other entities. Our groundwater must be protected to the fullest.

In the regulatory and legislative recommendations, it states that all future power plants in Madison County use surface water, preferably from Lake Livingston, just like Tennasco right down the street here. They use water from Lake Livingston.

The management strategy for Millican Reservoir needs to be eliminated from the IPP. The loss of wildlife habitat and bottomland forest will greatly impact our area.

Remove Bedias Creek out of the IPP as a viable alternative strategy. With Bedias removed from the plan, Bedias will immediately lose its unique reservoir site designation, and most of my other comments have to deal with Chapter 8. The first thing is Bedias Creek Reservoir is the only Region H reservoir site listed in both the 2008 reservoir protection study and the 2007 Water Plan as a recommended reservoir site. That concerns us here in Madison County. This concern is that Bedias is ranked No. 3 on the list out of 220 studied sites by the reservoir protection study. And we're ranked up there high. Allens Creek and I believe Columbia is ahead of us, and both of them are permitted and funded already. Us being ranked third is not good news for our county. If Bedias is eliminated out of the plan, it will take the unique reservoir status out of the program, and we'll be down on the list maybe in the middle of the list. People won't be trying to grab our water then.

Also again about the -- they call it the reservoir protection study or the reservoir acquisition study. This is a concern because in that study it recommends that land be acquired or bought up in advance of the Bedias Reservoir construction and put into a public trust. This kind of discussion has no merit and this study puts a fear amongst the tax paying public by trying to make the site a temporary park or in a trust fund. I don't know what they plan on doing there.

Our tax dollars should be spent on studying alternative strategies if, in fact, Bedias is an alternative strategy. In the regulatory and legislative recommendations, all discussions and ways to implement or encouraged alternative reservoir strategies like Bedias needs to be eliminated. Interbasin water transfers should remain like they are. Right now you're not allowed to transfer water from one river basin to another. For example, from the Bedias Reservoir and the Trinity River basin, the water shouldn't be transferred out of the Trinity River basin to the San Jacinto reservoir basin to Lake Conroe. This is the law right now, and they are asking to amend this. All river basin water should stay in the same basin.

In the financing policy, it says that Bedias should try to obtain state participation funds to help pay for the water transmission line from the reservoir to the back of Lake Conroe. This type of discussion to assist the water users only encourages to build Bedias. This project should stand on its own without any type of state bonds being sold.

In the policy item, it states the U.S. Corps of Engineers could help fund part of Bedias project, partly because it's a flood control project. Again, Bedias should stand on its own without any state, federal or Texas Water Development funds. Bedias Creek deserves ecologically unique stream site designation. It's one of the last major streams that runs from start to finish without having a dam on it. Bedias is unique in the sense it's the last major stream in our county that's untouched by the government. Please consider protection as a sensitive stream site for the 2016 IPP. Region H needs to reach out to the residents of Madison County for more public participation. We have two reservoirs on the plan, more than any other county, but we lack timely information. By the time we heard about Millican, you already voted on it.

Region H should have done a press release on the Millican before you voted on it in Chapter 4 back in October or November. A press release, too, before the final vote would have been good also so people can come to your meetings. I've been to your meetings, and one or two people comment because you don't send out what you're talking about. I believe that's why the Millican people are here. They just heard about it five days ago. Anyway, I appreciate the time for letting me comment. I have it in writing and I'll submit it also.

MR. EVANS: Thank you.

[APPLAUSE]

MR. EVANS: As was said, written comments -- you can submit those to our address and we'll put those back up again. I think hopefully enough cell phones have went off that you've checked your cell phones and put them on vibrate or turned them off. We would appreciate that.

Our next speaker is Cathy Cox.

MS. COX: I'm Cathy and this is Alice. And Alice has been very upset over the Millican Dam project. And I feel like she deserves her two seconds. So if y'all would give her a minute, I'll lift her up so she can talk in the mic. What did you want to tell them? Do you want to say it? She wants me to say it for her. She says please don't flood my farm because I love my animals. Is that what you wanted to say? All right, go sit. I'm not trying to turn this into a circus. I just feel like she deserves her voice heard, too.

I am Cathy Cox. We have a farm on the Brazos River bottom. My husband's grandfather bought it in 1937, and we are currently living there and working the farm. If they build the Panther Creek site, it will totally flood us out and we will lose everything.

I just think that -- you know, 50 years ago they brought this dam up and they said, you know, this is what we want to do. The land owners stood together and they fought it and said, no, it's not what we want to do. And it went away. And it's rearing its ugly head again. I think that we're smarter now. I think that we have more technology. There is no reason to build this dam and flood everybody out.

You can -- it's cheaper to build the aquifers, and there is nine aquifers in the state of Texas, than it is to build this dam. It is cheaper to build an aqueduct and pull water directly out of the rivers, which Trinity River could do no problem, than it is to build this dam. A smaller dam, two or three feet above the normal flow of the river, y'all can extract all the water you need. And pulling water out of the Gulf of Mexico like Mr. Robert said, those are all alternatives. I haven't seen anywhere where y'all even looked into those alternatives. And I'm saying, you know, we need to look into them. We need to be smarter.

This is horrible for our ecosystem. It's horrible for our environment. It causes more CO_2 gases than all your cars. This, you know, we're more intelligent now. Let's do something different. Let's don't do the same old thing because that's what we've done in the past.

I've got -- I could go on for days and days, too. So I really don't know where to start our stop, but I want to hit a couple more points. One is you're wrecking the oil production that's all up and down the Navasota River bottom. They'll have to cap off all those wells and no longer oil production. Aren't we in need of oil? Didn't Obama just say we can drill offshore and everybody is kind of glad he's taking a step in the right direction, and they are saying it's not enough. So if that's not enough, what are y'all doing by shutting it down?

There is lignite coal under some of that land that if y'all build a reservoir on nobody can get to. The people who live in Grimes County, they go to Brazos -- to Bryan/College Station for a hospital and whatever. If they get sick or are having a heart attack, they are going to have to take an hour detour all the way around this reservoir that y'all built. You're affecting human lives. You're affecting the economy. You're affecting so much more, and it doesn't look good on paper, and it doesn't look good in real life.

Robert pointed out that your numbers are wrong, and I wanted to point out that this just one discrepancy that I found, but in one table, Table 4b12.8-4 you say the raw water will cost 1.30. And then in another table, 4b12-1 you say the water is going to cost 1.90. You don't know how much it's going to cost because you haven't done the research to be able to know what it's about.

I guess that's all I got to say.

AUDIENCE MEMBER: Here here.

[APPLAUSE]

MR. EVANS: Thank you, Ms. Cox. And Miss Cox as well. As we previously said, all of your written comments will be submitted and entered into the record whether you have the time to speak or not. We also said we'll try to keep our comments to three minutes just to allow as many people the opportunity to speak as possible.

Leonard Cox.

MR. COX: Thank you, sir.

MR. EVANS: Thank you for being here.

MR. COX: Yes, that was my wife and she is a hard act to follow, but she wouldn't let me get off without saying something.

I'm kind of with Robert on catching the numbers and pulling together where it is. I've had people ask me what is the meaning of this conservation elevation? What is 263 feet? How does that impact people? Is there a condemnation elevation and how does that affect people? The 71,000 feet, is that actually taken at the top -- the 71,000-acre of water -- I'm addressing the Panther Creek Reservoir. The 71,000-acre, is that the water level at the top? Will there be land condemned beyond that as a protection land to protect that water as drinking water? And if so, how far back will that be pulled? So that 71,000 is really a low number that we're talking about here that could double or something? What are we dealing with here? How much shoreline is there around this? And how far does it go up Woodson Creek?

Is the Bundic Dam site a separate site from the Panther Creek site? Are we dealing with a plan that looks at two dams on the Navasota, or are we looking at an either/or situation where the strategy is one or the other? I can't make that determination by reading the documents that are out there on the Internet.

And since I'm in Region G, and looking at Region G, it seems that the Panther Creek was added at the very last minute. I kind of wonder, was it a serious consideration from the get-go to put in Panther Creek, or was it an attempt to slide it in under the radar at the last minute and hope the public wouldn't see it?

I want our neighbors to the south to have adequate water. I don't want to lose the valuable hardwood savanna that goes down through the Navasota bottom. Technology is growing. I think Mr. Robert Averyt quoted some numbers on the cost of the desalination process that would make it very compatible to provide water to Houston and Harris County, Region H. If we can put a man on the moon and build a permanent space station, I think we can get desalination to work. Thank you.

[APPLAUSE]

MR. EVANS: Thank you, Mr. Cox. Mark Dudley.

AUDIENCE MEMBER: He had to leave early.

MR. EVANS: John Melvin.

MR. MELVIN: I'm fine. I just had a question what the pool and flood stages are.

MR. EVANS: We'll address questions after the comments. Brenda Bender.

MS. BENDER: I may need just a little help from my husband. Thank you, Mr. Evans. Thank you for being here in Madison County and those from Grimes and Walker.

My name is Brenda Bender, and I'm here to address the Bedias Creek Reservoir. There are those of us in our community that have retired. My husband retired in 1992 from Pennzoil, and he bought land here in 1999 and built on it.

With recent illnesses, I'm disabled, and I can't hear. If I lose my home, I can't start over again. And I just ask that we take these in consideration. We have neighbors that can't start over again. We're not a wealthy community; but I think that there is other ways to go about getting water to those that need it. And I just thank you for your time as a concerned homeowner and small ranch. Thank you.

[APPLAUSE]

MR. EVANS: Thank you, Ms. Bender. Bill Knolls. I'm reading it the best I can.

MR. KNOTTS: Bill Knotts. I'm not much of a public speaker, and the speakers ahead of me have covered some of the territory I wanted to speak about, but a hearing like this when none of us know the details, we don't know what we're talking about. So why are you asking us questions? Why are you asking opinions when we don't know what our opinions are because we don't know what the reservoir is.

AUDIENCE MEMBER: Amen!

[APPLAUSE]

MR. KNOTTS: We went through this same thing in the '50's I think it was. My dad, Colter Hopkins, Woody Humphreys, the Cobbs, Jake Howard's parents, and we thought it was kind of over then, but you ought to know that when you're messing with the government, nothing is ever over. It comes back and back and back.

But to cut to the chase, I don't think we can give intelligent comments, intelligent answers until we see a topo map and know what the elevations are and know what we're looking at. And does any of the board own land on this Millican Reservoir? I think -- you know, who appoints the board, the governor or who?

I don't think anybody really in the hearing should be heard and given much credence unless you're a landowner, you're the county judges of the counties involved, the city council of Bryan/College Station and the landowners. I know normally in hearings like this, the people that are advocating recreation, fishing, skiing, duck hunting and things are always the most vocal.

The landowners, we just -- we've had so much thrown on us. I'm a landowner in the northwest corner of Grimes County. And I see that on this Region H, Grimes County is not even included in it, yet we're going to be burdened with a reservoir. And I didn't know what the elevation was. I've got a topo map of the original Millican Reservoir, and I think the pool level -- or the land acquisition level was about 237 feet.

Well, now, as I understand, Averyt said this will be 263. Well, we're going to divide property -- mine has some hills and it has some river bottom. It has some creeks -- Morgan Creek. It's going to isolate a lot of land that I have no access to. And I just don't see the reason in it. I think we've got a lot of bureaucrats that want to sit up there and do something with other people's money and don't have consideration of how you're harming the property owners of this area.

And like Limestone, to me, was a disaster. I just wonder if the Brazos River Authority is practicing on us this month because we have been flooded, unflooded, flooded again with no local rains. It's just a mess to try to -- I've got some land that's beyond the flood that cattle graze on, but then the river comes up and they got to swim water to get back. And I don't understand it.

The lake is silting up horribly. And I don't know why they can't discharge water from Lake Limestone no more than the capacity of the Navasota River channel. But it seems -- I know when they constructed the Limestone, you didn't have these vertical easements, and you didn't have -- you let a lot of developers go in there and build houses that are probably not two feet -- a foot and a half or so above the pool level. The Brazos River Authority doesn't want to be sued, so they dump it down to us downstream.

But I just don't understand the thinking, you know, behind reservoir construction like this and having no concern of the property owners. And just trying to bully us and put it in because it looks good, and I'm wholeheartedly against the whole project.

[APPLAUSE]

MR. EVANS: Thank you, Mr. Knotts, I would just say as far as how the Water Planning Group -- how many of us got appointed, we were appointed by the Water Development Board. Steve maybe can tell me ten years ago -- there have been a couple on since the inception, but the new members are appointed by the planning group themselves, and one of the things that we saw was that Madison County could use a representative on it and just in the last -- within the last year we appointed your -- the elected county judge of Madison County to be on the Water Planning Group.

Our next speaker is Daiquiri Beebe.

MS. BEEBE: Hi, I'm a landowner on Bedias, and I just want to talk in general about all the dams that are proposed. In recent years we had Lake Livingston and Lake Conroe and those were built from what I understand to supply water to Houston. But now it's not enough. And so when will it be enough? Continuing to build reservoirs is not the solution. We need another solution.

Texas has nine existing aquifers under the ground which have the ability to hold massive amounts of water. It's a different process obtaining the water, but it can be done. To get the water into the aquifers you need recharge zones, and to get the water out of the aquifers you need wells and a treatment station. All of these things cost substantially less and will use only a small fraction of land as opposed to the devastation to the wildlife, farmland, countryside and the lives of people that these reservoirs will cause.

I have an example of a situation in Idaho. The state legislature created a natural resources panel to look at the price tags of aquifers and dams. They compared increasing the size of an existing dam by five feet to recharging the Snake River Aquifer. The panel determined that the dam would cost $186 million and would hold an additional 67,000 acre-feet of water. The aquifer would cost $100 million and would hold 600,000 acre-feet of water. The aquifer will provide nine times the amount of water for about half the cost of the dam.

The Idaho state legislature chose the aquifer as their solution. I hope that this water board will do more research and find some aquifer experts to give you a proposal on how to supply the water needed in Houston. Aquifers are currently being used in San Antonio and in Bryan, Texas.

[APPLAUSE]

MR. EVANS: Thank you. Before I get the next speaker, if you do wish to speak, if you would see Glenda back here, wherever she's at, and fill out one of our comment forms and you'll get recognized. Our next speaker is Fred Davis.

MR. DAVIS: I'm here representing the (inaudible) Association. We have an interest in about 1,000 acres that hopefully is below the site of the proposed dam. I've been in the Navasota River bottom since I was approximately 13 years old and been hearing about this dam project for the last 30 years at least.

Hopefully we won't lose our ground to this dam, but we have been suffering through the Limestone Dam for as long as it has been there. One of the other general -- gentlemen pointed this out. Unfortunately the Navasota River bottom is one of the last hardwood bottom overflow areas in the state of Texas, most others having been destroyed. It's a unique habitat. And if Ducks Unlimited or some other conservation entity could entertain the thought, it would be considered a unique environmental habitat in this country.

Nevertheless, it is apparently the intention of some state governmental agency to inundate this unique habitat. Let me tell you about Limestone. We have been going through these floods which we can deal with and the habitat can deal with forever as far as I know. But ever since Limestone, there is not one flood, there is two floods or three floods and goodness knows what this new reservoir is going to impose on us.

I've got cattle, but they are not in the Navasota bottom, but it has killed virtually all of the mass producing trees in our bottom and no matter what we can do or try to do, we can't get rid of the water.

Now, I can sympathize with you homeowners wholeheartedly, all you ranchers wholeheartedly and those of us who own recreational property below you have our own unique problem, but this is not something that apparently is on the minds of planners. Apparently the plan is to have as many people live in Houston and wherever they want to live at whatever cost to the upstream folks that it takes. And it's not surprising to me that you had 12 people in Houston at a meeting and you've got several hundred here. There is a big difference between the takers and the givers in a problem like this.

[APPLAUSE]

MR. EVANS: Thank you, Mr. Davis.

Judy Greer. Did you have some public comments?

MS. GREER: Yes, but I wrote them all down. She's got them. This is it. I'm happy. I live in Brazos County. My family lives in Brazos County. I wasn't really going to say anything, but could we look at that first flow sheet that y'all put up on the PowerPoint?

MR. EVANS: We're going to get back to questions. If you have some comments to enter into the record, let's do those.

MS. GREER: My comment about the flow sheet was that the public opinions, the public comments was very far down on the flow sheet. And I believe that in America, when something is going to affect people to the degree that this will affect the people in this area, we're going to lose our land, we're going to lose our homes potentially, we're going to lose what we've built and what we've paid for and worked hard for so that our children and our grandchildren have something in the future. And if we don't have the right to have the initial comments before decisions and all this work and money is spent to develop these plans, I personally have an issue with that.

AUDIENCE MEMBER: Thank you.

MS. GREER: You're welcome. I also have done just a little bit of research because I haven't had much time, but I think putting in a dam creates so many -- makes so many things happen. All of the vegetation that you drown -- what happens to it? It dies. Is there any subsequent, I mean, consequence to that? Are gases given off? I'm not an environmentalist; but there are prices to pay for everything that we do. And I think we need to think about that. And our government needs to think about that and our representatives need to think about that.

What happens to a dam when all the soil, the silt that usually flows downstream doesn't get to the land downstream and that doesn't become as fertile as it used to be? Does that silt get locked into the dam? Does that affect the dam's function and the purpose of it? Does it limit its life? I mean, those are things I have questions about.

And who is going to pay for the annual cost of operating that dam for the next 100 years? Is it us? Is it the ones who have lost their lands and their homes? I mean I have really strong feelings about this, and I just wanted to say that. Thank you very much.

[APPLAUSE]

MR. EVANS: Thank you for your comments, Ms. Greer. That is all of the sign-up sheets for comments unless Jason has one more? Is that a public comment?

MR. AFINOWICZ: John Knotts.

MR. EVANS: I think he's already spoke.

MR. KNOTTS: That's my father.

MR. EVANS: John Knotts then. Did you wish to speak?

MR. KNOTTS: Yes. I'm not used to public speaking either. A lot of people have spoken before and have all the numbers and the questions and everything, and so I'm just going to keep it simple.

This river bottom on our property has been in our family for three generations with me and there is four or five more coming. And my wife and I have been looking forward to coming over there in the next few years and living there and looking forward to that for a long time as well as my father. And this is going to seriously impact our future for our entire family as well as all the other families that have plans. So think about it again real hard. Thank you.

[APPLAUSE]

MR. EVANS: Thank you, Mr. Knotts. That is all of the sign-up sheets we have that request to provide public comments. We've said many times we will take written comments that can be submitted as well.

But at this time if you have some specific questions, we're going to ask the consultants to come up here and they'll answer your questions -- attempt to answer your questions. I just want to say, too, that any questions that you have or anything that you point out about our draft plan, when this Water Planning Group meets on April 7th down in Conroe, I can assure you that the members will take all of the questions you have and your comments into consideration and we'll be discussing them, particularly if there are things in the charts that don't reconcile with each other. So we'll be looking at that as well.

So, Jason, if you want to come up and start fielding some questions -- and what we would just ask you to do for the record as well, we're going to have to get you to identify yourself so the reporter can get that and we'll try and see how we can do that.

MR. AFINOWICZ: I will try to do that to the best of my ability. As you've seen, it's a very large plan. I've had a good team helping me out. So I may have to call some of them in, but I'll do what I can.

Just before we get started with the Q&A, just a few comments. Going through the questions earlier as we received public comment, just had some thoughts. All of these strategies and the plan itself consists of over 50 strategies that were considered by the planning group, including some of the things that were mentioned like aquifer storage recovery and strategies like this have all been considered by the group and talked about, and throughout this whole process the public involvement has been emphasized and we want you to know that the public meetings for Region H are open to people all the time and we're always looking for this input. So this is one of the many opportunities we have for that.

As far as the specifics on Millican Reservoir, to be honest, the Millican Reservoir that you see in this plan is very similar to the one that you've seen over the years. There have been some updates. There have been updates to the firm yield of that reservoir. Obviously the costs of the reservoir have changed in this plan. But a lot of the initial specifics -- the specifics of that project are very similar from the very beginning and what you've seen in the past.

The reason why that is is because of the high level of this planning process. At this point, what we're doing is we're looking at strategies that may be alternatives in the future and which can be further studied and may be implemented into future projects.

At this point, there is still a lot of work to be done on any of these projects, and I just want to mention that first because there are going to be a lot of questions about Millican we may not be able to answer to your satisfaction at this point, just simply because of the high level nature of this planning. So certainly.

MR. AVERYT: I'd like to start off. My name is Robert Averyt, College Station, Texas. First of all, I'd like to ask if you guys can provide us with a detailed map of the Millican. I'd love to know where the dam is going to be.

AUDIENCE MEMBER: Or approximately.

MR. AVERYT: I want to know exactly. If you guys are going to do this, you need to be able to tell us where you're going to do it.

I would like to know the elevations. I would like to know the pool elevation and what somebody else asked about, the condemnation rights. I would like to know a timeline. I don't think -- you're talking about 50 different projects.

This affects our lives. My wife is sick. We have spent the last 15 years -- are we going to lose everything we've got? This and that -- do we move? What do we do? We're planning on building a 600-foot concrete driveway at our place. We live off of Highway 30. Do we go ahead and spend that money? Can you answer that? Do I need to postpone my plans? Can you answer -- can you give us a timeline?

It's easy for you guys to talk about 50 different projects, but this is our lives. Do we put our lives on hold, and at what point -- can you tell us at what point you will make a decision? A yes or no so we can get on with our lives at some point? I mean that would be -- to me that would be the No. 1 issue I have. Yes or no, am I moving out of my house? Am I staying in my house? Can I continue to plan for the future? If y'all can answer that, that would be huge.

MR. AFINOWICZ: Thank you. The charge to the planning group is really to look at some of the things we just talked about. What are the long-term needs and what supplies there are to meet them, and then make recommendations of strategies of what can be implemented. As you saw, like Bedias Creek, even though it's not included as a strategy in this plan or even the last plan, it was in the 2001 plan. There is somewhat of an evolution over time.

AUDIENCE MEMBER: Y'all have been holding that over those people's heads since 2001. That's not fair to us to have to live like that, guys. (Inaudible).

MR. AFINOWICZ: Right now --

[APPLAUSE]

MR. AFINOWICZ: It's a charge to the planning group to identify these potential strategies. However, there is no requirement of the planning group to implement that strategy. There is no funding for the planning group to do these sorts of things, and it takes an interested party to come forward once those needs have been identified to develop that project.

It's really out of the planning group's control when that project is truly going to be implemented. This is truly a planning exercise right now.

MR. EVANS: Let me just say just for format purposes, everybody is going to get a chance to ask your question. But since we have a court reporter, let's let one person ask their question. We'll try and answer that, and we'll take them one at a time and it will go a lot smoother and we'll get an accurate record of what is being said and asked tonight.

So this lady here had her hand up first.

MS. COX: I'm Cathy Cox. I'm in the same boat as Robert. I put my whole life on hold for y'all to make a decision. You keep saying it's a plan. Well, if all it is is a plan, then why is it on paper and, you know, if I build anything, you ain't going to reimburse me for it, are you? Are you going to give me 100 percent exactly what I can go and buy another 300 acres and build barns and build houses and build all the things that I need? No. You hesitated. You're not because you can't. But yet you can hold that over my head and say, hmmm... don't be fixing up that house yet Cathy because we ain't done with you yet. And he's right, that's not fair.

And you know why are the numbers so far off if y'all didn't do your research and you didn't -- you didn't find out your numbers and get them all in line, I mean, from one page to the next page, they are wrong. It's either 1.30 or it's 1.90 but it can't be both so your paper is wrong.

So why did it get printed if it was that far off if you haven't done your research?

MR. AFINOWICZ: Again, to address your first question there, it's not the role of the planning group to implement any of these projects. It's simply the matter of looking down the road and trying to see what's on the horizon. That's the charge given to the planning group by the state, and that is entirely what they are able to do. It does not involve -- give them any opportunity to make promises of what projects are going to be implemented.

MS. COX: So then what other alternatives did y'all look into besides the reservoir?

MR. AFINOWICZ: The primary alternative, Millican Reservoir, is a transfer of water from East Texas. It's actually in the plan in Chapter 4 to give an alternative to that, and this was weighed heavily by the planning group before the decision was made. And one of the reasons for choosing Millican over the East Texas alternative is because it represents the development of water resources within the Brazos basin to meet needs in the Brazos basin rather than pulling them from another basin in East Texas.

Other options that would partially offset Millican would be the Little River Off Channel project, although it wouldn't fully offset the need for water the Millican could provide.

MR. EVANS: This gentleman right here.

MR. MELVIN: John Melvin. Just two questions: Do we have an idea what the full pool number is going to be? And what the flood stage numbers is going to be in terms of elevation?

MR. AFINOWICZ: Right now there is a number that's in the plan that is a conservation pool that does include what that number is. That's really as much as there is. Flood stage would have to be determined later on down the road. Once the project was actually picked up by a sponsor and studied to further detail, because it does involve the hydrology and the hydraulics of the basin and a much more detailed study than what can be done at the planning level exercise.

MR. MELVIN: So what is that number for the conservation stage above sea level?

MR. AFINOWICZ: 263. Thank you for my brain over here.

MR. MELVIN: I have one more question. So if the legislature identifies the Millican Reservoir site, you know, the Millican area or this reservoir as a future reservoir site, what does that actually mean to the landowners? How does that impact landowners and what they can do with that property in the future? What kind of things do they need to be thinking about if something like this gets passed by the legislature?

MR. AFINOWICZ: There is no impact as far as what the landowners can do with their own property. There is no control over private citizens. What that does do is it prevents the state from coming in and building another project, doing something that would reduce the opportunity for that project to -- that area to be developed into a water supply project.

MR. MELVIN: So does it or does it not limit --

MR. AFINOWICZ: It does not impact --

MR. MELVIN: -- if somebody wants to come in and put a mall or a fun park or something like that, it doesn't affect the future value of the property?

MR. AFINOWICZ: It does not impact the individual's ability to develop that land as they choose.

MR. MELVIN: And so when --

MR. AFINOWICZ: Only the state.

MR. MELVIN: So when the state comes in to grab the land or get the land to build the reservoir, does the -- do the improvements on the property -- are those taken into consideration during the condemnation process?

MR. AFINOWICZ: That would have to be determined by those sponsoring the project and implementing it. It's a long way down the road from there.

MR. MELVIN: But the legislative decision to identify it as a reservoir does not affect how that's -- how the value of the construction on the property or the homes or businesses that are built on that property, does the legislative decision affect those values?

MR. AFINOWICZ: It doesn't directly impact any -- any individual's ability to develop that land. Only the public's ability to --

MR. MELVIN: I'm talking about the individual's ability to get fair market value for the investment they've put into their property.

MR. AFINOWICZ: That would entirely depend on the specifics of how that's worked out further down the road once that project moves forward.

MR. EVANS: The gentleman back here in the back. You may have to speak up a little bit.

AUDIENCE MEMBER: I'm from Madison County. My family has been here since the early 1800's. If the president of the United States doesn't do his job, we, the people, replace him. I'd like to know who you work for and how we -- who pays your salary and how -- if you don't perform like the people want you to, how do we replace you? You say you've been there ten years. That's a long time. How do you get replaced if --

MR. EVANS: You talking about me?

AUDIENCE MEMBER: Can we vote you out of office?

MR. EVANS: No, actually I'm not running for reelection. I'll be leaving the planning group at the end of the year.

AUDIENCE MEMBER: How do we vote against you or --

MR. EVANS: You could have moved to Trinity County.

AUDIENCE MEMBER: Who do you work for?

MR. EVANS: We're not compensated in any way. The planning groups were formed with specific interest groups -- for instance, I was appointed to represent counties in this planning group. So that's how we were appointed.

AUDIENCE MEMBER: Who appoints the planning group?

MR. EVANS: Well, I think I just answered that question just a few minutes ago. We were appointed by the Water Development Board at the start of the planning group, all the original members. As the members leave the group, they are replaced by vote of the members of the planning group based on nominations from the public, from other members of the group, citizens of the region, of the counties and as the determination of the --

AUDIENCE MEMBER: So we actually vote --

MR. EVANS: The planning group votes. There is not a popular vote, no, sir.

AUDIENCE MEMBER: Who creates the Development Board?

MR. EVANS: I think we're probably going to try to stick to specific questions about the plan tonight and not get into state government. Whoever your state representative is, that would be a good question for him.

AUDIENCE MEMBER: Where is Steve Ogden?

MR. EVANS: Listen, I know y'all see a lot of meetings on TV and all, but this is not going to be one of them. So questions -- this gentleman right here.

MR. MILLBURGER: My name is Lionel Millburger. I have one simple question. It's a two-pronged question centered around who pays and who benefits from this thing.

In other words, I want to know how much public tax money is going to go to fund and build this thing? And then what, if any, private, corporate interests are going to benefit from it? Other than taxpayers. Now furthermore --

MR. EVANS: Before you go any further, let me just -- as you're asking a question, if you would refer to a specific project, if you have a question about a reservoir, if you just speak to this thing, we don't know whether you're talking about the plan itself or a reservoir. For the purpose of the record, identify what you're speaking to.

MR. MILLBURGER: The reservoir, the subject of this meeting which there is no map for. So I presume it's this Millican Reservoir. To prompt you in answering my question, I want you to know that most of these reservoirs like this are used among other things for cooling purposes for industrial sites.

Now, so the two-pronged question -- and I may have a follow-up depending on your answer.

MR. AFINOWICZ: To answer that on Millican, Millican appears to be the main focus of everyone's interest. It's one of the many projects, but to give more detail on that, right now again there is no actual sponsor identified that's moving this project forward. Right now all this is is a paper that's been done many years as Texas goes through this cycle of planning for the future. Simply a matter of looking at what the needs are and what projects are out there to supply future demands.

And as there is nobody who is in the place of sponsoring this project, there are no contracts in place. There is no money that's changed hands. There is really nothing that's moved forward that would seal in who is actually paying and benefiting from this project once it's finally developed.

MR. MILLBURGER: The follow-up question -- I'm a taxpayer, and so let the record show that I'm against it. Now, to further prompt you in what is it going to be used for, have you considered the fact that this reservoir or reservoirs can be used to supply water sources for a nuclear power plant some time in the future?

MR. AFINOWICZ: That is one of the uses that it could potentially be used for. Right now in the plan it is --

MR. MILLBURGER: Oh-oh.

MR. AFINOWICZ: Right now in the plan it's slated for municipal and industrial needs in the lower basin. However, that could change over time, and there is also additional water left over in the Millican project. After the immediate needs of Region H, it could be used for multiple purposes, including -- some of which is being used in Region G, Brazos County, or projected to be.

MR. EVANS: The gentleman in the blue striped shirt.

AUDIENCE MEMBER: Have y'all taken into account a strategy in which y'all label this or get the legislature to label it a unique site because it will drive property values down so at the time you go to purchase it, or whoever is buying up the land, it's already devalued because once you label it a unique site, you destroy our appreciable value of the property. So I guess is that part of y'all's strategy or is it just an unintended consequence?

MR. AFINOWICZ: That's something that the planning group would have to consider and that can be part of the comment in making their decision.

[MULTIPLE SPEAKERS]

MR. AVERYT: Robert Averyt again, guys. With respect to -- this is a question and answer thing. We've asked a bunch of questions. We have not received one answer. I mean, how do we receive answers? I mean is this a dog and pony show? What can we expect? How do we get answers?

MR. EVANS: We're not going to take any more questions until we get to where we can hear.

MR. AVERYT: How do we get answers?

AUDIENCE MEMBER: Y'all hush. We can't hear. We need quiet.

MR. AFINOWICZ: And what we try to do is provide all the answers we can, both in our forum tonight and also in the plan. Now, what you see before you in the plan is a culmination of all the information in the planning process up to this point. There really isn't anything behind the scenes. The information we provided on the website is what we have at this planning level.

MR. EVANS: The lady in the very back. She's had her hand up for awhile.

MS. EVANS: My name is Laura Evans, and I live here in Madison County, and there is a whole lot of us here tonight that are going to be really impacted by the Bedias Creek Reservoir. It's Bedias. It really offends me when the people who are trying to do it can't pronounce it. It's been Bedias since there were Bedias Indians.

[APPLAUSE]

MR. EVANS: We did have a former chairman of the planning group that pronounced it Bedies but the current chairman does say Bedias.

MS. EVANS: There is a whole lot of Madison County people here that we don't need any water. We needed it last year and year before last. Madison County has been dry as hell, and nobody cared that we were about to burn up from all the damn drought. So we really don't give a damn about giving our land to anybody to put water on.

They are going to take it. That's the way it's done. And our livelihoods -- we can't come to Houston on April 7th. These people in this room are working every day trying to hang on to that land that's going to get taken away. Everybody here -- these people work. The land is going to get taken away from hard working people, lots of them got great granddaddies buried on it like I do, and we don't want it flooded.

And we want to know when they are going to come here and meet with us because this is our land. They can come up here and meet with us. So tell them they can come up here and meet with us.

MR. KNOTTS: Bill Knotts again. The fellow that commented about moving water from one river basin to the other -- that can be circumvented. I live in

Huntsville. My property is in Grimes County, but the city of Huntsville in conjunction with the Trinity River Authority went over here and gave water to the Tennasco Power Plant in Shiro which is in the San Jacinto River Authority. Their first intent was to build a reservoir on Big Lake Creek. Well, the good property owners on there shot that down. So we made a deal that the TRA sold the water to Huntsville. Then the city of Huntsville pumped the water over to Tennasco into another river district. So it can be done. I mean, laws are laws, but laws are made to be broken.

But two or three specific questions, I guess what the question we want answered, you people don't have the information. I guess the Brazos River Authority will have what we want, the elevations, the maps and everything. Is that right?

MR. AFINOWICZ: The Brazos River Authority pretty much has what we have which is planning level information for this reservoir. It's all very general at this point.

MR. KNOTTS: But you see if your board recommends to the state legislature to go ahead with this project, then our complaints to the Brazos River Authority are literally after the fact. So they'll have no impact.

AUDIENCE MEMBER: That's right.

MR. KNOTTS: Because the decisions have already been made.

MR. AFINOWICZ: There is a long process beyond this plan before a project like that would be implemented.

MR. KNOTTS: If your board recommends a reservoir being built, there's about a 90-95 percent chance of it being built.

MR. AFINOWICZ: Not so. As we said, there have been many strategies over the years that have been included in the plans and then better plans have come along and those have been removed. Yes, ma'am.

AUDIENCE MEMBER: Three to four years ago, many of us were in this same room with representatives -- State Representative Dunham said we had nothing to worry about with the Bedias Creek Reservoir. We were lied to. We need to consider that and this source.

[APPLAUSE]

MR. EVANS: There is a gentleman in the back in the cap.

MR. BOYD: I'm Paul Boyd. I got a question for you. Harris County is how many acres? You got any idea?

MR. AFINOWICZ: Was that acres? That's a good question. I couldn't answer that one.

MR. BOYD: Let me just finish this up now. Harris County probably gets close to four foot of rain a year. And I guarantee you there is millions of acres down in that area. So why don't they collect their own water and then we don't have to worry about it.

[APPLAUSE]

MR. AFINOWICZ: Thank you for your comment.

MR. EVANS: This gentleman right here.

MR. BANNING: I'm Jerry Banning. [INAUDIBLE]. They've already been designated in Bedias? In other words, if I want to sell some land down in the Bedias Creek bottom, there will be a cloud on the title of my land I'm going to have to reveal to anybody. Is that correct?

MR. AFINOWICZ: I can't speak to what the impacts would be as a landowner.

MR. EVANS: I used to be an appraiser and I would just say that it's not going to have a cloud on your title in any way. But that's not to say that when the appraiser is looking at market value, that might be some type of circumstances that a particular appraiser may or may not do.

AUDIENCE MEMBER: He'll have to disclose it for the buyer. He'll have to disclose it.

MR. BANNING: Yes, I'll have to disclose the fact that that reservoir is fixing to take my property. That's the state law.

MR. MARTIN: My name is Tyke Martin. I have property in Madison County and in the Bedias Creek project.

One question and one comment. The question I have is that have y'all even considered when paying for this land that -- say I want to keep my land. You build your dam. Fill it with water, and I'll sell you the water. You just pay me my check every month like an oil royalty? You know, maybe that would be a good thing. Is that something that y'all have considered is letting us keep our water rights but paying us for them? Because generally speaking, in the past, we're not going to get what our land is worth to us. I've owned my land 50 years, and I know people in here that have owned it -- I don't know how many generations that go back to Sam Houston. Have y'all considered letting us own the water and selling it to y'all after y'all build your dam?

MR. AFINOWICZ: Well, just to remind you, I want to point out that what the planning group is doing every night is presenting a plan, and as we said, there is a long way from here to there.

MR. MARTIN: But that is -- I'm asking you that is a plan of how we actually get something for what we've worked hard and sweated for. Is that an option that y'all have considered? I mean, isn't that an option that's been considered? And if it hasn't, then what can I do to make it get considered?

MR. AFINOWICZ: The decision of how that will be made would have to be done down the road once somebody is moving forward with this project, and right now the planning group has only identified this as a possible alternative for meeting the needs in the future. There is nobody who is currently building a reservoir or planning one in detail. And once that goes to that phase, that will be an appropriate thing to bring up and the concerns of how the landowners will be compensated for their land and how that will work out, but that's beyond the scope of this planning exercise.

MR. MARTIN: And then my next question is -- and I think other people have alluded to it -- is we want to know who we go and talk to, and who we shake the tree? I mentioned Steve Ogden a minute ago who he was on the committee that voted to approve this next five years I think that the land is under that -- under your umbrella or in the plan, if you will.

Well, you know, if we have a problem with being in that plan, don't vote for Steve Ogden and vote for somebody else. So my question is -- what the plan is, is that for these five years the state of Texas has a purchase option on our property indirectly, if you will. We're -- in other words, they have kind of set it out. My question is who do we talk to to tell them we don't want to be in that? We want to know which legislators we talk to. Do we talk to Senator Ogden? Who do we go talk to? Is it our state representative? Are these the people who we go shake the tree? That's really all we're asking, and it seems like these questions are being avoided. That's one of the reasons why Robert left.

MR. EVANS: Senator Ogden is chairman of the Senate Finance Committee. So any funding of any state projects, be it reservoirs or whatever, is going to pass through that committee. So yes, Senator Ogden would be a person that if you have -- if you have opposition or concerns to any specific projects, be it Millican, Bedias or whatever, yes, that's where the funding will come from from the state for any of the projects.

AUDIENCE MEMBER: Haven't there been some legislative approval already on some of the plans that y'all are looking at, the projects that are in the works?

MR. EVANS: Well, every new legislative session is a new legislative session.

AUDIENCE MEMBER: But I'm talking in the last year, year and a half, has there been some legislative approval on Region H's projects?

MR. AFINOWICZ: There has been legislative adoption of those unique reservoir sites.

AUDIENCE MEMBER: Right.

MR. EVANS: We need to get to some more questions.

AUDIENCE MEMBER: That's what the people are wanting to know, who do we vote in and who do we vote out.

MR. EVANS: There is a man back here with a star on his shirt. Could you speak up, please, sir.

AUDIENCE MEMBER: I'm with (inaudible) with the North Zulch Utility District. I have a president and vice-president (inaudible). We're concerned what this is -- how it's going to affect our utility district as far as providing water to the residents in our area. We have lines going that way. I would like to know if you're going to send us a plan to tell us exactly what's going to happen. Because we have people that live on a budget without water. We want to know what's going to happen with those people, you know, and our water lines. We want input from y'all as to how it's going to affect the North Zulch Utility District.

MR. AFINOWICZ: North Zulch is actually in the Region G group that is just across the border from Region H. There is more information in their plan that will be more pertinent to you than what's in the Region H plan and with just across the border.

AUDIENCE MEMBER: What I'm saying is we have lines that go into H. Now, I want to know what you're going to do about those lines. How are we going to be reimbursed and how these people on Bundic -- if they lose their land, how do we supply them? We just cut our line off and say the heck with it? We'd like to know what's going to be involved with the North Zulch Utility District.

MR. AFINOWICZ: I wish I could provide you some more information there, but it's really outside of this level of planning. Sorry, sir.

MR. EVANS: Who hasn't had a question. I think -- this lady right here. Yes, ma'am, you.

MS. HUGHES: I've got a couple of questions. I'm Marilyn Hughes from Bedias. Based on your projections, what year do you show as pulling water from this Millican Reservoir?

MR. AFINOWICZ: The initial needs for Millican Reservoir begin in 2040 of the Region H plan as well as the Region G plan. So they would both begin at the same time.

MS. HUGHES: It's supposed to be 2030 in Region G?

MR. AFINOWICZ: 2040. I'm sorry.

MS. HUGHES: On your website you said 2030 in Region G. It shows 2030.

MR. AFINOWICZ: My understanding of the Region G plan --

MS. HUGHES: That's 20 years from now. Does that mean that you're going to pull -- get permits, condemn people's land and be up and running in 20 years?

MR. AFINOWICZ: I would not know the specifics of the Region G plan. My understanding was that they would also start using water from the project in 2040 as it's currently planned just as Region H is.

MS. HUGHES: So that's 30 years.

MR. AFINOWICZ: That's correct.

MS. HUGHES: Would you buy land that you know was designated a unique reservoir site?

MR. AFINOWICZ: I certainly can't speak to that. That's certainly outside of my pay grade.

MS. HUGHES: Is there anybody in this -- is there any question that anybody has asked you tonight that you can answer?

MR. AFINOWICZ: We've answered everything that we can within the scope of this project.

MS. HUGHES: As far as I'm getting, all I've got is a runaround as you can contact this person or you can go to the next meeting, or you should have been at the last meeting, but I haven't heard a question answered in this meeting tonight except go ask your congressman.

MR. EVANS: I don't think anybody has said go ask a congressman anything.

MS. HUGHES: We were talking about Ogden.

MR. EVANS: He's not a congressman, he's a state senator. All this is state projects. This gentleman right here.

AUDIENCE MEMBER: Historically with other projects like this that have gone through, you keep talking about this potential sponsor that you don't know about, in previous projects that have gone through, who have been the sponsors or is it private corporation or the state arm or something like that?

MR. AFINOWICZ: Typically in the state of Texas, reservoir projects for the most part have been sponsored primarily by river authorities, possibly the Corps of Engineers, other folks in that capacity. So it would most likely go to someone at that level if there is interest in the project and moving forward with it in the future.

AUDIENCE MEMBER: So it's usually a government organization?

MR. AFINOWICZ: Yes, sir.

MR. EVANS: Okay, this gentleman right here.

AUDIENCE MEMBER: Do any of y'all live in Houston, Texas?

MR. AFINOWICZ: No, sir, I don't. A few of the consultants do and a few of the planning group members do.

AUDIENCE MEMBER: I go down to Houston every once in a while. I'm in the landscaping lawn maintenance business. I'm a rancher. I'm going to tell you what, every time I go down to Houston, I see more water running down the curb that would fill that lake 50,000 times over. Why can't Houston do something about the water they waste instead of taking my land?

MR. AFINOWICZ: You know, I can't agree with you more about the wasted water, but just a few things to consider -- the plan includes an awful lot of conservation, looking at using the water that's already there before needing to go get more water. There is also plans for reuse and in general Region H has one of the very lowest per capita water demands in all of the planning regions in Texas. I think it's the fifth lowest out of the 16 planning regions in the state.

There is always room to improve. And I agree with that, but the planning group has tried its best to implement the conservation it can or feels is reasonable before moving forward with other larger projects.

MR. EVANS: This lady back here in the back. Yes, ma'am.

AUDIENCE MEMBER: First of all, I thank you for being here tonight and having this meeting. I know it's not pleasant to stand up in front of a group of people like us who are so concerned about our property. I'm speaking as a fourth generation landowner. My great grandmother bought the land -- and I see cousins here that I didn't realize that were going to be here -- in 1892 and it's heartbreaking for us to know that this might happen to us again. I was that little girl who the woman brought up to the podium 50 plus years ago with my mom and dad when the Millican Reservoir -- the Millican Dam was being talked about and I know the agony.

I went by the nursing home today on my way over with my cousin to come to the meeting to see my 87-year-old mother who is suffering from Alzheimer's -- and I'm sorry I'll make this quick. She said, "Do you want me to go with you, dear? I will speak on behalf of the family." And this is the woman who can't remember whether she had breakfast or lunch or not, but she remembers the Millican Dam.

So on behalf of my relatives of Peach Creek and of the people -- our family that settled the land, and as we are still ranchers and farmers in that area, I beg of you to give us more information and let us understand what is happening to the future of this land.

I also had one question, which it's not time for comments, it's time for questions, and I appreciate you recognizing me, Judge, thank you. If you're ready to pull water by 2040 from the Millican Reservoir, how soon do you have to start construction and condemnation of the land in order to have it filled and ready to pull water by 2040 which is only 30 years from now?

MR. AFINOWICZ: Specifically how long it would take to develop a project like that -- you're not going to like this, but I'm not going to have a definite answer, but generally it's a long term process and that's why this long term 50 year planning horizon, this whole process that we're going through in planning was initiated by the state because it was recognized that a lot of these projects take a long time to develop. And a lot of the water resources we have today are all thanks to work that was done many, many years ago in developing those reservoirs so people can have supplies.

It would be really hard to say what that number is going to be and what development time is. I can tell you that Allens Creek Reservoir is recommended as a year 2020 strategy, and we're already here in 2010. Talking about a very short period to get that done. I believe it would definitely be longer than that. I'd hate to say specifically, but I would imagine 20 years or so.

MR. EVANS: This gentleman right here. If you could for the record --

MR. WILLIAMS: James Williams from Brazos County. At one time there was a dam going to be built out of Bellsville on the Brazos River. Is that project still ongoing?

MR. AFINOWICZ: That is -- I believe that's Allens Creek you're speaking of in Austin County?

MR. WILLIAMS: Yeah.

MR. AFINOWICZ: That is recommended as a strategy beginning in 2020 because of those immediate needs.

MR. WILLIAMS: All the water is going to go down from the Navasota River anyway. Why don't you just pull it out of that lake and give it to Houston instead of building the dam?

MR. AFINOWICZ: Part of that is the way that reservoirs work and where water rights can be obtained and used, stored in a sufficient volume. The Allens Creek project benefits from being in a good location that it can provide an awful lot of yield without much storage. The problem is building a larger reservoir for an off channel project like that to firm up and what's called a run of river supply, that's water pulled directly out of a river rather than a reservoir, to firm up that supply to make it reliable would be a massive reservoir just like the size of Millican like we're speaking of. So the logistics really aren't there to enhance that project.

MR. WILLIAMS: All about money though, $2 billion for the Millican at today's price -- no telling what it's going to be 30 years from now in price. Anyway, that's my question.

MR. EVANS: The lady in the blue. Yes, ma'am.

MS. KIRBY: My name is Sandra Kirby and all I want to know is when you're going to have a meeting for Grimes County. Because a big part of Grimes County is going to be affected by the Millican Reservoir.

MR. AFINOWICZ: The planning group is directed by the state to conduct public hearings within its boundaries, and Grimes County is outside of Region H boundary and within the Region G boundary.

MS. KIRBY: Okay -- but Region H is going to be part of this Millican Reservoir. So why aren't they having a meeting in Grimes County?

MR. AFINOWICZ: Well, there are projects that are implemented all over the region. There are only three that Region H is holding, and there are projects being implemented in practically every county in Region H. This is an opportunity for Region H to hold a meeting in the northern portion of the region and hopefully bring in as many people as possible from surrounding areas.

AUDIENCE MEMBER: It's April 21st in Waco.

MS. KIRBY: I'm not going to drive to Waco.

AUDIENCE MEMBER: That's the only one they are having for Brazos G.

MR. EVANS: The gentleman back there in the purple shirt.

MR. HODARD: My name is Wayne Hodard. I live in Madison County. I'm wondering what our county judge who happens to be on the board -- how he feels about this project, the Bedias Creek project, and the flooding of Madison County. I'd like his opinion.

MR. EVANS: Well, Judge Hanson might want you to come to commissioners court and ask that question.

JUDGE HANSON: I'd be happy to meet with him.

AUDIENCE MEMBER: We're here. We're here to meet. Come on and tell us what you think.

MR. EVANS: There are elected officials from your county who might be here. This gentleman back here hadn't had a question.

MR. ROWE: I have a house on Bedias Creek, 70 acres, which I dearly love.

MR. EVANS: Yes, sir, what's your name?

MR. ROWE: Glen Rowe, and I would like to know the exact status of the Bedias Creek Reservoir, what the legislature has done, who might buy the water if it's actually built and some kind of time.

MR. AFINOWICZ: Yes, sir. Currently, the project was recommended as a unique reservoir site. It was included in the site protection study by Texas Water Development Board. At this point that's as far as the project has gone. It's not even recommended as a strategy in the Region H plan. It's merely a strategy that is out there among like hundreds of others. Many different reservoir projects. Currently there is no sponsor behind it nor is it being recommended by any level of planning.

MR. ROWE: Well, Bedias Creek flows into Lake Livingston which supplies the water to the City of Houston, right?

MR. AFINOWICZ: Yes, sir.

MR. ROWE: Why can't it wait until it gets down to Lake Livingston?

MR. AFINOWICZ: Well, the needs --

MR. ROWE: [INAUDIBLE].

MR. AFINOWICZ: The needs Millican Reservoir are intended to address aren't associated with the City of Houston.

MR. ROWE: I'm talking about Bedias. I live on Bedias Creek. I hunt. I fish. I farm. And that's all [INAUDIBLE]. Is there a sponsor for it?

MR. AFINOWICZ: There is currently no sponsor for the project.

MR. ROWE: So that water would be shipped from Walker, Madison County down into Montgomery County. Is that right?

MR. AFINOWICZ: There is no plan for using that water right now.

MR. ROWE: Then don't build it.

MR. EVANS: If it has no sponsor, chance of it getting built with the current information would be pretty small.

AUDIENCE MEMBER: Well, I'm planning on building a house.

MR. EVANS: This gentleman right here in the hat.

MR. BALCH: My name is Eddie Balch from Brazos County. I've got one question that you can't dodge. What happens to the houses that are flooded and the cemeteries?

MR. AFINOWICZ: That again, as much as I'd like to answer that, is a design level question and we're very far away from that phase of the project.

MR. BALCH: You want me to tell you? They knock down the houses and they dig up the cemeteries.

MR. EVANS: I mean if you got to that point, I think you're exactly right. A cemetery is like the cemeteries on highways. This lady in the blue shirt.

MS. LAMBERT: Yes, sir, I'm Shirley Lambert, and I live in Bedias out in the country. We don't have a whole lot of land, but we think it's a little piece of heaven. And I never heard of Bedias until 1984. And we bought our property and we dreamed until 2000 and my husband retired and we built our dream home. And I'd just like to know if where the lake is going to be, if we're going to have ocean front property or are we going to be on an island or -- and he's got cancer. Going through treatment now and if we're going to need to move, we need to move while we can still walk. You know, we can't -- we can't -- we're not getting any younger. And that's what I wanted to know when we're going to have them do something. I don't want to be moving when I'm 98.

MR. AFINOWICZ: The maps that are included in the plan are the best available information right now on the project because the project isn't moving forward and there is no plan for design at this phase.

MR. EVANS: The lady -- yes, ma'am. You.

MS. STOVER: I'm Christina Stover. I'm the mayor of Iola, and I am chairperson of the Grimes County Subregional Planning Commission. And I have a question, there are -- you said there are three public hearings at this stage that are already scheduled?

MR. AFINOWICZ: That's correct.

MS. STOVER: When the plan develops further, will there be more public hearings?

MR. AFINOWICZ: At this point, after the three public hearings that we spoke about, these are the best opportunities that are intended to get public comment, but public meetings after this -- the public is also invited to make comment to the planning group as they wish, and there are going to be a few of these throughout the year. Currently the plan is due September 1 of this year. So there will be opportunities as the planning group meets to work out the specifics of the final plan that will be submitted to the state where people can comment.

MR. EVANS: The gentleman right -- on the right. Yes, sir. You.

MR. HARRIS: My name is Brad Harris and I own property --

MR. EVANS: You may need to come up a little bit.

MR. HARRIS: My name is Brad Harris. I own some property in Brazos County that's off of Highway 30. You've said in this meeting right here that the strategy is to pull new water into Region H out of East Texas. Is that correct?

MR. AFINOWICZ: That's an alternative strategy to the currently proposed Millican Reservoir.

MR. HARRIS: Then why don't you try and build an aquifer to pull it out of Sam Rayburn and pull it in where you've already got an existing reservoir?

MR. AFINOWICZ: Imports from East Texas, the Neches and also the Sabine have been considered and those are those alternative strategies that are part of the Region H plan. And I believe the reason that the planning group moved away from those is an interest in developing a resource within the basin of demand rather than taking it from another basin and moving it in. It was -- this was a discussion that was had at one of the planning group meetings several months ago when it was debated quite a bit before this action was directed to move forward with Millican as a recommendation.

MR. HARRIS: Basically what y'all have done is this Panther Creek project and Millican is basically the same plan. It's resurfaces about every four to six years here or there as it's happened. And it's really starting to come to fruition after you built Limestone.

Now, my parents have had land up here since Limestone and somebody asked earlier from the time they started building to the time they started drawing water -- well, Limestone started in '75 to '76 and took to '79 before it got filled. They started pulling water and opening it up to the public in 1980, that's whenever the people were allowed on the lake. So it gives you basically from the time they start building to the time they start drawing water is about a five-year plan on this thing. This is from first being up here basically since the lake was developed.

Now, by the Panther Creek project with the land where we're sitting which is out between Hardy and Lee Road off of Highway 30, the backside of our land will be approximately five feet under water, and if you take any additional, we've lost our land that we've been there since 1965. My sister has a house out there, and I run my business out of that place. And there is no way that y'all are going to be able to compensate us for exactly the full market value after I've already put over $200,000 into the place personally so my family can make a living.

MR. AFINOWICZ: Thank you for your comment.

MR. EVANS: I think everybody else has had a question.

MS. HADAWAY: I'm Karen Hadaway, and my question is after listening to all of this, we live in Grimes County -- in North Grimes County. I'm on the Board of Directors of the Bedias Creek Soil and Water Conservation District. We discussed this a lot in our meetings. Heatedly.

One of the things that I want to find out and ask you directly -- and I would like an answer -- even though they have these question and answer sessions, these informational gatherings, you're taking questions. You're talking to us. You're telling what people are thinking. Does what we say have any impact on whether this is going to happen or whether we're just over here just blowing wind?

MR. AFINOWICZ: It has everything to do with what's included in the plan. And the planning group is required to look at all these comments and to take all those into consideration when developing the final plan. And it will be up to them to take a look at the comments and questions and use that to gauge a decision of how the final plan is going to shape up.

MS. HADAWAY: So the general public here will eventually have an actual impact on what is happening here? These people that have lived here -- my family has had land here since the 1930's, too -- my husband's family. I mean, we're all concerned. And the thing is that are we just sitting here and you're just going to say, oh, yeah, okay, here is what they said, blah, blah, blah and they are going to do what the heck they want anyway. Is this out of our hands exactly like everything else with government? They made a decision. They want to do this. The money is going to go down -- going to be given little bits of money here. The big money will be made by selling water to Houston and it will go back into the coffers of the state of Texas. Is that correct?

AUDIENCE MEMBER: Yes.

MR. EVANS: To answer your question about does what you're saying tonight at any of these public meetings have merit? Does it have an effect? Can you change things? Can you have an impact? The answer is clearly yes because if one thing that you all learned and we learned is when the public -- when there is a project that is being proposed to be built like the TransTexas Corridor, public input can change minds. And it changes representatives' minds and it changes senators' minds and it changes minds of elected officials at the top. So, yes, it can have an impact.

And if there are specific projects like Bedias or Millican, you know, where you have -- particularly in Bedias' case where there is strong public opposition to it, I think, yes, it can have an impact. I don't think you're wasting your time at all.

I'm sorry, I thought you had already asked a question.

MR. PITTS: Donald Pitts from College Station, and I have some questions on the Millican Reservoir. I don't understand how this is in Region H which is Freestone, Leon and Madison Counties when the reservoir is in Brazos County -- you know, the reservoir will be mostly in Brazos County. Where else can we go -- you said there is a Region G that will be talking about this or handling this also?

MR. AFINOWICZ: Yes, sir. Region G is basically the same thing as Region H. It's a similar planning group that has the same initiative and everything that does include Brazos County, and as I mentioned before is a strategy that is shared between Region G and Region H.

MR. PITTS: How can we find out anything about this Region G? Will they be having meetings on the Millican Reservoir?

MR. AFINOWICZ: Yes, sir. They are required to have a public hearing. I'm not sure about the specifics of the date, but I think I heard someone yell it out over there earlier. Was it later this month?

AUDIENCE MEMBER: April 21st in Waco.

AUDIENCE MEMBER: Waco?

AUDIENCE MEMBER: At ten o'clock in the morning.

MR. EVANS: Folks, we're going to get an answer from the Water Development Board if everybody will just hold on a minute.

MS. MCKINNON: She's correct. It's April 21st, the Brazos River Authority, in Waco and they typically meet at ten a.m. Can you verify that time? I can't confirm for sure.

AUDIENCE MEMBER: I thought y'all were trying to get this out to the local people, you know, Brazos County has to go all the way to Waco to participate in Region G? We only heard about this meeting a week ago in the Brazos -- the Bryan/College Station newspaper just a week ago. We have schedules, you know, just like y'all do. And how are we going to -- you say you think it's April the 21st?

MS. MCKINNON: I know it's April 21st.

AUDIENCE MEMBER: It's in Waco.

MS. MCKINNON: I work for the Water Development Board. I'm a liaison with the Region H group, not Region G specifically. By rule, each region is required to hold one public hearing centrally located in the region, and Region G is having their one public hearing at Waco which is the center of that region.

AUDIENCE MEMBER: Okay.

MS. MCKINNON: And they issue -- they are required to issue public notice 30 days prior to the hearing as posted on Secretary of State website, posted with all the --

AUDIENCE MEMBER: I don't follow that one really.

MS. MCKINNON: All the major newspapers in the region, every courthouse, every mayor, so it's an extensive notice process.

MR. EVANS: They are typically at the county clerk's office at your county, the public libraries in your cities.

AUDIENCE MEMBER: But I can't run down there --

MR. EVANS: I understand, but that's Region G and we're really speaking to Region H this evening.

AUDIENCE MEMBER: My final question on here is someone has to have a map of this Millican Reservoir that we can look at, not the final details, but a map that will identify the immediate location where this is -- you know, where you're planning -- you can't stand up there and tell me that this doesn't exist. There has got to be a map that we can look at and --

MR. EVANS: Is there a map of the Millican -- proposed Millican Reservoir site?

MR. AFINOWICZ: Yes, sir, there is a map, and not just the one we saw that identified the unique reservoir sites, but also one in more detail -- again, planning level, not design -- but in -- what's the appendix that's located in --

AUDIENCE MEMBER: 4b-12-138.

MR. AFINOWICZ: Of the Region H plan.

AUDIENCE MEMBER: 4b-12-138.

AUDIENCE MEMBER: On mineral rights on the land that's flooded, is that retained by the landowner or is that incorporated into the land that's taken for the reservoir? That's one point.

MR. EVANS: Those are the kind of issues for what the Water Planning Group -- what we do, those are way beyond what our scope is.

AUDIENCE MEMBER: I understand. That will have to be answered. My second point is I know you are talking about general, and specific plans are a long way down the road, but some people will get tired of holding their hands and contacting when the level dies down. Somebody puts a check on a piece of paper and says that looks like a good plan based on these charts and information and that check affects everybody's lives forever. So everybody keep it up.

MR. EVANS: This gentleman right here.

MR. JOZWIAK: My name is Gerald Jozwiak. I have several comments here. First one about the unique reservoir site of Millican. Only Region H designates

Millican as a unique site. Region G -- it's not in Region G as a unique site. Cedar Ridge and two other ones, but Region G is not claiming it as a unique site. The reason people are speaking up today is that once it gets past the planning group for a unique site designation -- I went to Austin to testify to try to stop it. First it goes to the regional planning board, and then it goes to the state, and once it's in the state plan, then it goes to Austin. I testified in Austin in front of the House Committee of Texas Natural Resources. And they said we can't do anything. We can't change the state water plan. You should have stopped it at the regional planning. So if you don't want Bedias to be a unique reservoir site, you should have stopped it at the regional. How can you stop it here when our comments really don't mean anything?

And then on top of that, the person who was on the committee for the Texas House Committee was Brandon Creighton out of Montgomery County who needs the water for Bedias Creek. So the guy on the committee that designated it a unique site is the same guy that's on the committee of the Texas Natural Resources Education Committee. It's a no-win situation for us here and people in the Bedias area. That's why they are trying to stop it here with the Millican. Once it gets to the state, you can't stop it there.

MR. EVANS: We've got the room until 8:30 and it's 20 to 9. So we're going to go for 15 more minutes. So if you can, we're going to get to as many questions as we can and stop at 9.

MR. MCMAHON: My name is Jerry McMahon. I live in the west end of Madison County. I'd like to know concerning the Millican Reservoir how close the water is going to get to Highway 39 that runs on the west end of Madison County?

MR. AFINOWICZ: We'll see what we can pull from the map real quick. Not enough to tell at this phase. I'm sorry.

AUDIENCE MEMBER: Judge, this lady has had her hand up.

AUDIENCE MEMBER: [INAUDIBLE]. Alternate methods to meet the needs of people down south, is that something that your planning group studies or is it a separate planning group? And what alternate methods have been investigated and what is the result of those investigations?

MR. AFINOWICZ: The Region H planning group, while its recommending -- recommended strategies, these are the strategies like the ones we talked about tonight, at the same time some of the strategies they've considered that didn't make the first cut, if you will, became the alternative strategies. And one of those is the East Texas water transfer like we spoke of. This is just another part of the planning process. Region H has done this for some time. This is actually the first planning round we've actually been able to do that officially, but even before that Region H as a planning group had adopted some of those alternative strategies. So it is within the Region H group itself.

MR. EVANS: This gentleman right here.

AUDIENCE MEMBER: What were those alternatives that were investigated?

MR. AFINOWICZ: I believe there are nearly 60 strategies that were considered for the region overall. And the ones that were selected were a transfer of water from East Texas, the Sabine basin. That was the largest. Others were sea water desalination, and trying to think of other ones off the top of my head -- Little River Off Channel.

AUDIENCE MEMBER: Has conservation methods within the area that needs the water been a primary consideration?

MR. AFINOWICZ: Yes, ma'am. Conservation is the first strategy that the planning group applied to meet the demands.

AUDIENCE MEMBER: And you have determined that that is not going to meet the demand?

MR. AFINOWICZ: Not entirely.

AUDIENCE MEMBER: What percentage would it meet?

MR. AFINOWICZ: I believe in this plan it's approximately 7 percent, which is slightly less than what was in the last Region H plan based on kind of a gut check more than anything else. The level of conservation that Region H has in the previous planning round, 2006, and the state water plan I believe ranks about the fourth highest in all of the planning regions throughout the state. So Region H does have a substantial amount of conservation incorporated into the plan.

MR. EVANS: This gentleman right here. Yes, sir.

MR. LUTHER: My name is Mike Luther. I'm executor for the Gertrude Luther estate, College Station, Brazos County. We have property behind the curtain area that would have minor incursion of water, but my question is far more important I believe to Bryan/College Station, Brazos County, and the people understand that the TransTexas Corridor issue has been so soundly rejected. I believe -- I think the mayor that's here and the rest will agree with me that there is a very important need for high speed rail service to College Station, Bryan, Brazos County and so forth and nowhere in this plan have I seen or heard of anybody that's handling the absolute requirements to merge high speed rail with where the Millican Dam and the water in the proposal might be to minimize the damage to all the people, to minimize the damage to the property, and yet maximize the economic benefits to all of the people that are in this room.

I would like to have the question answered, do you plan -- and is there any way to include the high speed rail service in the decades of the future that absolutely must be here for us to go forward in the future?

MR. EVANS: I can tell you that we have not discussed high speed rail --

MR. LUTHER: I asked that for that reason, sir.

MR. HEATH: Charles Heath concerning the Bedias Reservoir. My family has had land there for five generations now. We live on the land on Bedias Creek on Caney Creek. I heard someone ask about the -- was this water in Bedias Reservoir going to Montgomery County? And I believe you said you didn't know.

Somewhere or another we've been told that that's where it was going to go was Lake Conroe -- even told us what creek it's going to run into to get there. I mean I went through this stuff 30 years ago. I went through it again -- I guess we heard about it finally about four years ago. If it hadn't been for Gerald, nobody would have known about it then. Our county officials seemed like they didn't know anything or didn't tell us.

And another thing, we were told that it's not just the land that the water is going to cover, but it's going to be tens of thousands of acres all around it that they are going to take. Do you know anything about that? Has that been -- is that out of the picture now?

MR. AFINOWICZ: Regarding the first part of that question and specifically that project, the Bedias Reservoir is not a recommended or even an alternative strategy in this 2011 plan. In the past, and I believe in the 2001 plan it was recommended as a strategy, and I believe that was -- there was a plan to convey that to Montgomery County. None of that is included right now and the needs of Montgomery County are met solely out of what they have in Lake Conroe and in addition to that some water from Lake Livingston. And I'm sorry I missed the second part of your question.

MR. HEATH: The other land they are going to take all around, the wildlife -- it is outrageous. Is that still -- is that part of this plan?

MR. AFINOWICZ: Again, none of that is included and that is -- if that project ever is picked up and carried anywhere, if someone does bring that back, that would have to be considered at that time how much land would be needed and that would be not just an inundated area, but some level of surge pool just for protection and possibly some mitigation.

MR. HEATH: So all of that can come back?

MR. AFINOWICZ: That's all something that would be related to that project if it ever arose again. At this point it isn't part of the plan.

AUDIENCE MEMBER: I have a question for you. Is the best way to find out the land that's going to be affected is take a USGS or a government map and just run the topo line? Is that going to be our most effective way to see what's affected? Just pick up the topo line?

MR. AFINOWICZ: That's essentially the shape that we show in the plan. That's the way that was originally developed a long time ago.

AUDIENCE MEMBER: And what elevation -- is it the 263 or 273? Which one do we need to look at to know which land is affected?

MR. AFINOWICZ: As far as I know, it's the 263.

AUDIENCE MEMBER: All the website showed 273.

MR. AFINOWICZ: The conservation pool would be 263. Above that, I'm not sure what the specifics are on what the surge pool would be.

AUDIENCE MEMBER: To find out what land would be affected is to take a USGS map and look at 263 or a little above. Is that correct?

MR. AFINOWICZ: That's one way of doing it. That should match very closely with what's in illustration.

AUDIENCE MEMBER: How involved has the planning board been with TxDOT?

MR. EVANS: I think I would say not at all. I don't think there's ever been a TxDOT representative at any of our meetings. I don't think there has ever been any correspondence from TxDOT to the planning group. So I think the answer would be none.

MR. BARNEY: I just have a quick simple question. Name is Mark Barney in Grimes County. Are these minutes of this meeting going to be available publicly for us to get off of a website?

MR. EVANS: We'll let Glenda answer that question.

MS. CALLAWAY: Yes. They will be available. We will put them on the website. They will likely be June the 8th when we put them up because that's when the comment period ends. And we will put up not just the transcript of the hearings, but all the written comments that are received as well.

MR. BARNEY: Okay, thank you.

MS. CALLAWAY: regionhwater.com.

AUDIENCE MEMBER: Bedias Creek is still a unique reservoir on the list. Is that correct? It's still on your list?

MR. AFINOWICZ: That's correct.

AUDIENCE MEMBER: How are we going to get it off? It drops off in 2015 if there is no activity going on. I believe the last one in 2007 -- I believe they passed the legislation that if there is no activity going on to acquire land or do something with that, it drops off in 2015 I believe is the way the legislation is. Isn't it up to Region H to recommend to the legislature to drop it? Is that the direction?

MR. AFINOWICZ: You know that's actually a good question because I'm not sure about the order that the planning group would take to remove a site, but they are able to continue to recommend a site for designation. Temple, I don't know if you know some more.

MS. MCKINNON: No, I suppose it could be included as a legislative recommendation, but whether a site is removed from designation, that's strictly a legislative action.

AUDIENCE MEMBER: Doesn't it have to come though from Region H to take it off?

MS. MCKINNON: Or a legislator independently. The process within the planning effort is that the regional plans develop legislative recommendations, and then our agency is charged with developing a state water plan which we compile the regional recommendation, and that's what we deliver to the legislature and the governor. And if a legislator chooses to craft legislation around those recommendations, that's their choice to do. There is no set process.

MR. EVANS: I think when the state water plan is considered by the legislature, and it's up for adoption, they can strike and add whatever they would choose subject to committee approval, subject to final form, that type of thing.

AUDIENCE MEMBER: [Inaudible]. It's up to Region H to get their attention.

MR. EVANS: I don't think so. I don't think there is any legislator over there or representative or senator that needs us to get their attention on an issue they want to attend to.

AUDIENCE MEMBER: It's going to be up to us to go to our legislators to get it dropped?

MR. EVANS: I think that would probably be a good step because that's who is going to ultimately be the decision-maker on all of this, be it reservoir sites, funding, implementation. All of that is going to be a legislative process, not a process of this planning group.

AUDIENCE MEMBER: I just want to make a correction. You said that Bedias wasn't an alternative strategy. In Chapter 8 it says it was dropped as a management strategy, but it's still a viable alternative strategy. When it says "viable," that means it could be stuck in at any time.

MR. AFINOWICZ: That is a good point. That does say that, and just to clarify what's intended there, there are official alternative strategies that have been included as part of the plan. And it's actually in a section in Chapter 4 that when the planning group goes in to enter this information into a great database the state is going to use to compile into a plan, there are recommended strategies and alternative strategies. And the project is not in that list. However, in the general sense, it could potentially be an alternative in the future just like any of the projects.

AUDIENCE MEMBER: Last statement, one way to stop it from being a unique site is to drop it out of the plan. Once you drop it out of the plan, it loses its designation right away. All Region H has to do is say it's not in our plan, just pull it all out, and it's not a unique site anymore. And that's what people are asking is to pull it out of the plan completely. If they are not going to build it, pull it out of the plan.

MR. AFINOWICZ: It's actually going to retain its legislative designation until that expires.

AUDIENCE MEMBER: Unless y'all pull it out of the plan. How can it be a designated site when it's not in the plan?

MR. AFINOWICZ: The legislation that designates that is separate from the Region H plan. Those are recommendations that the legislature uses to make those designations.

AUDIENCE MEMBER: I appreciate it very much.

MR. EVANS: One last question.

AUDIENCE MEMBER: He's ask if you can completely take it out of the plan, the Bedias Reservoir, so we don't have to be concerned with it coming up later. If you're not recommending it, can you just take it out of the plan so the legislature doesn't even have to look at it?

MR. AFINOWICZ: The planning group can choose to do that. However, the current designation that's there is going to continue to be there until it expires.

AUDIENCE MEMBER: That would be awesome if the planning group would do that. Yeah!

MR. AFINOWICZ: That comment will definitely be taken and put in the record.

MR. EVANS: I think first we want to thank Judge Henson for suggesting that we come to Madison County and hold a public hearing. Judge, thanks for having us over here.

JUDGE HANSON: I told you they would be interested.

MR. EVANS: We knew that. I can assure you that when we have our meeting in Conroe, those of us that are on the planning group that were here tonight will be sharing the public input that we received tonight about this project.

AUDIENCE MEMBER: Then how come you didn't share what Houston said?

MR. EVANS: Well, I wasn't there myself so I don't have anything to share.

AUDIENCE MEMBER: I don't blame you. I wouldn't go to Houston either.

AUDIENCE MEMBER: I avoid it like the plague.

MR. AFINOWICZ: And to give you the short summary between you and me, a few questions about conservation is the largest portion of that, and that will be part of the public report that Glenda spoke of along with this meeting that everyone will have a chance to take a look at.

MR. EVANS: Thank y'all for coming and thank y'all for having us here.

(Hearing adjourned at 9:00 p.m.)

Appendix 10G

Public Hearing Materials
April 7, 2010

This Page Intentionally
Left Blank

Contents – April 4, 2010 Public Meeting

REGION H WATER PLANNING GROUP
Senate Bill 1 - Texas Water Development Board
c/o San Jacinto River Authority
P. O. Box 329, Conroe, Texas 77305
Telephone 936-588-7111

TO:

- Each mayor of a municipality with a population of 1,000 or more or which is a county seat that is located in whole or in part in the Region H water planning area;
- Each county judge of a county located in whole or in part in the Region H water planning area;
- Each special or general law district or river authority with responsibility to manage or supply water in the Region H water planning area based upon lists of such water districts and river authorities obtained from Texas Commission on Environmental Quality;
- Each retail public utility, defined as a community water system, that serves any part of the Region H water planning area or receives water from the Region H water planning area based upon lists of such entities obtained from Texas Commission on Environmental Quality; and
- Each holder of record of a water right for the use of surface water the diversion of which occurs in the Region H water planning area based upon lists of such water rights holders obtained from Texas Commission on Environmental Quality.

RE: **Public Notice of an *Initially Prepared 2011 Region H Water Plan (IPP)***

DATE: February 26, 2010

PUBLIC NOTICE

To All Interested Parties:

The Region H Water Planning Group area includes all or part of the following counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker, and Waller.

Notice is hereby given that the Region H Water Planning Group (RHWPG) is requesting public review and comment on an Initially Prepared 2011Region H Water Plan (the IPP).

A summary of the content of the Draft Initially Prepared Plan: The *Initially Prepared Plan (IPP)* updates the 2006 Region H Water Plan that was included in the 2007 State Water Plan prepared by the Texas Water Development Board (TWDB). The IPP addresses the following topics:

- Water needs based on projected population and water demand
- Water supplies available to meet projected water demand
- Water management strategies for meeting any identified water shortages
- Socioeconomic impact of not addressing shortages
- Impacts of Management Strategies on Water Quality and Agricultural Areas
- Water Conservation and Drought Management

- Protection of Water Resources and Natural Resources
- Proposed Unique Stream Segments
- Proposed Unique Reservoir Sites
- Regulatory, Administrative and Legislative Recommendations

Public Comment: Public hearings to receive public comment on the IPP will be held at the following dates and locations:

March 30, 6:30 p.m.
Houston-Galveston Area Council
3555 Timmons, 2nd Floor, Room A
Houston, Texas 77027

April 1, 6:30 p.m.
Truman Kimbro Convention Center
111 West Trinity
Madisonville, Texas 77864

April 7, 10 a.m.
Lone Star Convention Center
9055 FM 1484
Conroe, Texas 77303

The RHWPG will accept written comments until 5:00 p.m. June 8, 2010. Written comments should be provided to:

Hon. Mark Evans
Chair, RHWPG
c/o San Jacinto River Authority
P.O. Box 329
Conroe, Texas 77305-0329

J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Questions or requests for additional information may be submitted to: Reed Eichelberger, General Manager, San Jacinto River Authority, P.O. Box 329, Conroe, TX 77305-0329, telephone 936-588-7111. The San Jacinto River Authority is the Administrator for the RHWPG.

A copy of the Initially Prepared Plan for 2011 is available at the County Clerk's Office and at a depository library in each county in Region H. A list of depositories is attached. A copy also is available on the RHWPG website at www.regionhwater.org and on the regional planning section of the TWDB website at www.twdb.state.tx.us/wrpi/rwp/rwp.htm.

DEPOSITORY LIBRARIES IN REGION H

AUSTIN COUNTY
Gordon Library
917 Circle Drive
Sealy, TX 77474

BRAZORIA COUNTY
Angleton Public Library
401 East Cedar
Angleton, TX 77515

CHAMBERS COUNTY
Chambers County Library
– Main Branch
202 Cummings
Anahuac, TX 77514

FORT BEND COUNTY
George Memorial Library
1001 Golfview
Richmond, TX 77469

GALVESTON COUNTY
Rosenberg Library
2310 Sealy
Galveston, TX 77550

HARRIS COUNTY
Houston Public Library - Central
1st Floor, Bibliographic Information Center
500 McKinney
Houston, TX 77002

LEON COUNTY
Ward Memorial Library
207 East St. Mary's
Centerville, TX 75833

LIBERTY COUNTY
Sam Houston Regional Library
and Research Center
650 FM1011
Liberty, TX 77575

MADISON COUNTY
Madison County Library
605 South May
Madisonville, TX 77864

MONTGOMERY COUNTY
Montgomery County Central Library
104 Interstate 45 North
Conroe, TX 77301

POLK COUNTY
Murphy Memorial Library
601 West Church
Livingston, TX 77351

SAN JACINTO COUNTY
Coldspring Area Public Library
14221 State Highway 150 West
Coldspring, TX 77331

TRINITY COUNTY
Blanche K. Werner Library
203 Prospect Drive
Trinity, TX 75862

WALKER COUNTY
Huntsville Public Library
1216 – 14th Street
Huntsville, TX 77340

WALLER COUNTY
Waller County Library -
Brookshire/Pattison
3815 Sixth Street
Brookshire, TX 77423

Region H Water Planning Group Public Hearing for 2011 Initially Prepared Plan

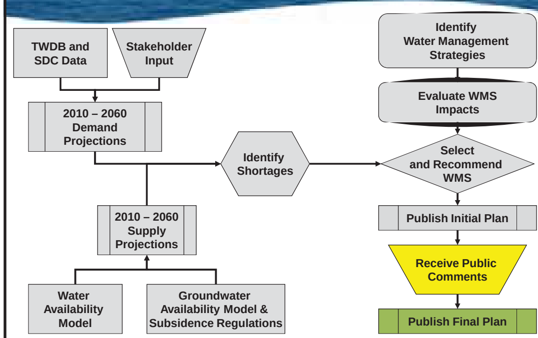
April 7, 2010

Lone Star Convention and Expo Center, Conroe

Regional Water Plan Overview

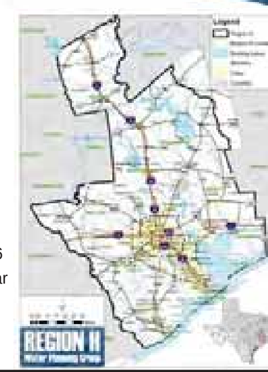
- Region H Overview
- Population and Water Demand Projections
- Water Supply Estimates
- Water Management Strategies
- Protection of Water Resources
- Unique Stream Segments & Reservoirs
- Administrative, Regulatory and Legislative Recommendations
- Infrastructure Financing Survey and Recommendations
- Special Studies

Regional Water Planning Process



Regional Water Planning

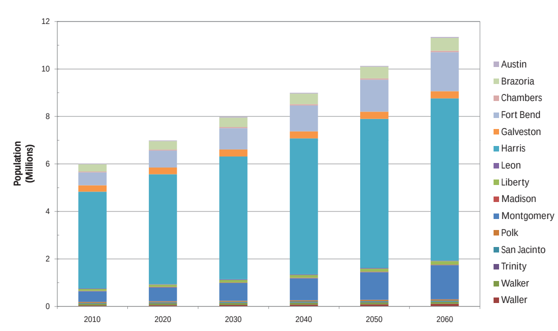
- 16 Planning Regions
- Region H
  - 15 Counties
  - 3 River Basins
  - 4 Coastal Basins
  - 2 Major Aquifers
  - 4 Minor Aquifers
- 50-year water plan (2010-2060), updated every 5 years
  - Previous Plans: 2001 and 2006
- State Water Plan published one year after final regional plans



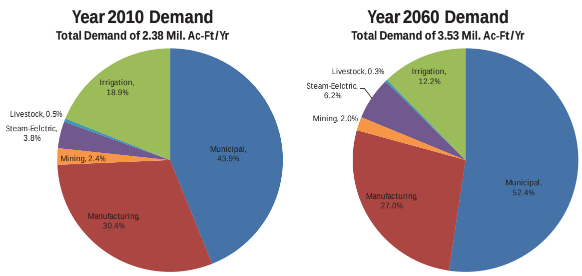
Population and Water Demand Development

- Revision to values in the 2006 Regional Water Plan
- Updated population and associated demand with data from various sources:
  - State Data Center
  - Texas Water Development Board
  - Individual communities and water authorities
- Approved by Region H in public meetings
  - May and July, 2009
- Approved by Texas Water Development Board in October, 2009

Population Growth



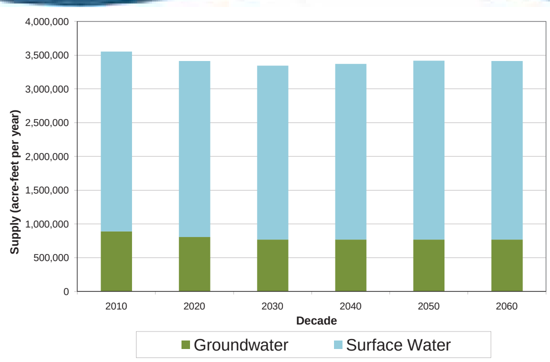
Demand Comparison – 2010 and 2060



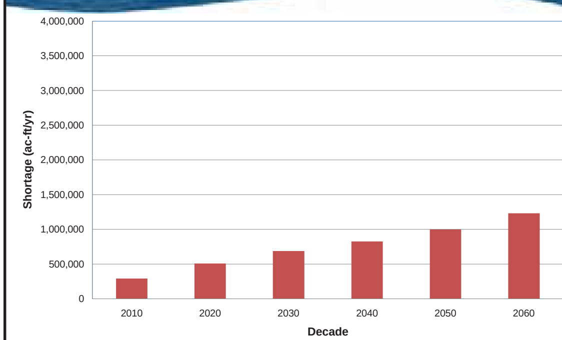
Available Water Supplies

- Supplies determined by
  - Surface Water Availability Model (drought of record)
  - Groundwater Availability Model or local regulations
- Total Existing Supplies
  - 3,561,017 acre-feet per year
  - 75% surface water
  - 25% groundwater
- 2060 Available Supplies
  - 3,415,860 acre-feet per year
  - Groundwater use reduced by regulation
  - Reservoir storage reduced by sedimentation

Existing and Projected Water Supplies



Projected Supply Deficit



Selected Management Strategies

- Conservation Strategies
  - Industrial
  - Irrigation
  - Municipal
- Contractual Strategies
  - Contracts to water users (WUGs)
  - Contracts among water providers (WWPs)
- Groundwater Strategies
  - Expanded Use of Groundwater
  - Interim Groundwater Use
  - New Groundwater Wells for Livestock

Selected Management Strategies

- Groundwater Reduction Plans
  - City of Houston
  - North Harris County Regional Water Authority
  - Others
- Reservoir Strategies
  - Allen's Creek Reservoir
  - Gulf Coast Water Authority Off-Channel Reservoir
  - Millican Reservoir
- Permit Strategies
  - Brazos River Authority System Operations
  - Houston Bayous Permit

Selected Management Strategies

- Reuse Strategies
  - Houston Indirect Wastewater Reuse
  - Wastewater Reclamation for Industry
  - Wastewater Reclamation for Municipal Irrigation
  - Others
- Infrastructure Strategies
  - Luce Bayou Transfer
  - COH, NHCRWA, WHCRWA, CHCRWA, and NFBWA Transmission and Distribution Systems
  - CLCND West Chambers County System
  - Others

Selected Management Strategies

- Other Strategies
  - Brazoria County Interruptible Supplies
  - Brazos Saltwater Barrier

Major Water Management Strategies

Major WMS	Sponsor	Selected Strategy	Projected Start Decade	2010	2020	2030	2040	2050	2060
				Total Allocated (ac-ft/yr)					
Reservoirs									
Allens Creek Reservoir	BRA / Houston	Y	2020	-	76,441	93,688	97,954	99,580	99,650
GCWA Off-Channel Reservoir	GCWA	Y	2030	-	-	39,500	39,500	39,500	39,500
Millican Reservoir (Panther Creek Dam)	BRA	Y	2040	-	-	-	11,627	58,351	120,994
Contractual Strategies									
TRA to Houston Contract	TRA / Houston	Y	2030	-	-	116,738	123,524	123,524	123,524
TRA to SJRA contract	TRA / SJRA	Y	2040	-	-	-	7,935	39,096	76,476
Reclamation/Reuse									
Houston Indirect Wastewater Reuse	Houston	Y	2040	-	-	-	66,420	114,679	128,801
NHCRWA Indirect Wastewater Reuse	NHCRWA	Y	2040	-	-	-	7,300	16,300	16,300
Wastewater Reclamation for Industry	Houston, Manufacturing	Y	2060	-	-	-	-	-	67,200
Permit Strategies / Other									
Brazoria Interruptible Supplies for Irrigation	GCWA	Y	2010	104,977	86,759	64,000	64,000	64,000	64,000
BRA System Operations Permit	BRA	Y	2020	-	6,621	18,870	25,350	25,350	25,350
Interim Strategies	NA	Y	2010	45,512	-	-	-	-	-
Total				**150,489**	**169,821**	**332,796**	**443,610**	**580,380**	**761,795**

Protection of Water Resources

- Water Conservation
  - Recommended as the first strategy
  - Applied to meet projected shortages
- Strategy Selection Process
  - Yield and environmental impacts were considered with the unit cost of water
- Existing Supplies
  - Utilized prior to recommending new water supply projects
- Reuse
  - Included in Fort Bend, Harris County and Montgomery
  - Recommended in lieu of additional imports/reservoirs

Unique Stream Segments

- Eight stream segments were selected in 2006 and adopted by Texas Legislature:
  - Armand Bayou
  - Austin Bayou
  - Bastrop Bayou
  - Big Creek (Fort Bend)
  - Big Creek (San Jacinto)
  - Cedar Lake Creek
  - Menard Creek
  - Oyster Bayou
- 2011 Regional Water Plan retains the designations for these sites

Unique Stream Segments

Unique Reservoir Sites

- 2011 Regional Water Plan includes five Unique Reservoir Sites
  - Four already designated
    - Allens Creek Reservoir – *2011 Selected Strategy*
    - Little River Reservoir
    - Little River Off-Channel Reservoir
    - Bedias Reservoir
  - One recommended for designation
    - Millican Reservoir – *2011 Selected Strategy*

Unique Reservoir Sites

Designated Sites

- Allens Creek Reservoir
  - Strategy in 2001, 2006, and ***2011*** RWPs
  - Austin County
- Little River Reservoir
  - Strategy in 2001 RWP
  - Milam County
- Little River Off-Channel
  - Strategy in 2006 RWP
  - Milam County
- Bedias Reservoir
  - Strategy in 2001 RWP
  - Grimes, Madison, and Walker Counties

Unique Reservoir Sites

Millican Reservoir

- Not yet designated by Texas Legislature
- Recommended in 2011 Region H Plan
- Location:
  - Primarily Brazos, Grimes, and Madison Counties
  - Located on Navasota River
- Yield: 194,500 afy
- Capital Cost:
  - $1,159,907,000

Policy Recommendations

- Retained 15 Recommendations from 2006 Plan
  - 3 Administrative and Regulatory Recommendations
  - 12 Legislative Recommendations
- One New Legislative Recommendation
  - *Direct the State Demographer's Office to explore the potential changes in population distribution made possible by rapid advancements in information technology.*

Water Infrastructure Financing

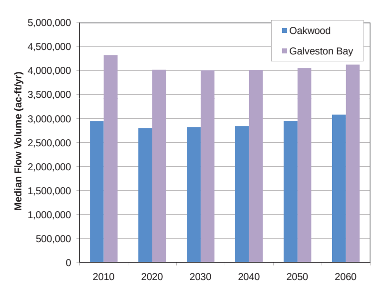
Infrastructure Funding Requirements

- Capital Costs for the 2011 Region H Water Plan
  - Estimated at $12.9 Billion (2008 Dollars)
- Water Infrastructure Financing (WIF) Survey
  - 2011 Survey will utilize TWDB Web based tool
  - Objectives:
    - Determine number of entities with finance needs
    - Identify infrastructure costs that cannot be financed locally
    - Summarize each WIF project and location in Plan

Special Studies in the 2011 Plan

Impacts of 2006 Strategies to Galveston Bay

- Modeled Impacts Over Time (2010 – 2060)
- Considered Upstream Impacts
- Near-term reductions in flow offset by higher return flows in long-term
- Mitigate increased water usage in later decades



Special Studies in the 2011 Plan

Water Conservation

- Conservation Survey
  - Included municipal, industrial and commercial conservation
  - Additional conservation plans obtained from TWDB
- Conservation Management Strategies
  - No change to Irrigation conservation strategies from 2006 RWP
  - WUG specific strategies where applicable
  - 3-tiered municipal strategy based on WUG size for other municipal WUGs
  - Conservation used to address over 200 WUG shortages

Public Comment on the IPP

- IPP Available:
  - *http://www.regionhwater.org*
  - *County Clerk's Office in each county*
  - *Depository library in each county*
- Public Hearings
  - Tuesday, March 30th @ 6:30 PM – Houston
    - Houston-Galveston Area Council
  - Thursday April 1st @ 6:30 PM– Madisonville
    - Truman Kimbro Convention Center
  - Wednesday, April 7th @ 10:00 AM – Conroe
    - Lone Star Convention and Expo Center

Public Comment on the IPP

- Taking comments through:
  - *5:00 PM June 8, 2010*
- Please submit comments to:
  - Hon. Mark Evans
Chair, Region H Water Planning Group
c/o San Jacinto River Authority
P.O. Box 329
Conroe, TX 77305-0329
  - J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Questions and Comments

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☐ I would like to speak on the following topics:

NAME: BRAD AYERS

AFFILIATION:

ADDRESS:
City | State | Zip

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☒ I would like to speak on the following topics:

NAME: JERRY WALL

AFFILIATION: Land owner

ADDRESS: 19250 FM 974 Bryan Texas 77808
City | State | Zip

979-589-2470 | | 4JerryWall@Gmail.com
Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☒ I would like to speak on the following topics:

Millican Reservoir

NAME: Jim Wall

AFFILIATION: Land Owner

ADDRESS: 14080 Dilly Shaw Tap Rd Bryan, TX 77808

City | State | Zip

979-589-1010 | | jimw@txcyber.com

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

Reservoir

NAME: Mark Dudley DUDLEY?

AFFILIATION:

ADDRESS:

City | State | Zip

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

NAME: Kay Wilson speaking for her Paula Moore

AFFILIATION: BV resident

ADDRESS: Bryan (City) TX (State) 77808 (Zip)

979 820.3024 (Telephone) | (Fax) | (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

NAME: Richard Tauber

AFFILIATION:

ADDRESS: Houston (City) Tx (State) 77024 (Zip)

713-825-2281 (Telephone) | (Fax) | RichardTeTauber@il co (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

REGION H I.P.P.

NAME: KEN KRAMER

AFFILIATION: LONE STAR CHAPTER, SIERRA CLUB P.O. BOX 1931

ADDRESS: AUSTIN (City) TX (State) 78767 (Zip)

512-476-6962 (Telephone) | 512-477-8526 (Fax) | Kenwkramer@aol.com (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

water use/reuse, ecology unique habitat

NAME: Laura Klemm

AFFILIATION:

ADDRESS: ~~[illegible] Road~~ Bryan (City) TX (State) 77808 (Zip)

979-589-23201 (Telephone) | (Fax) | LauraKlemm@hotmail.com (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

Opposition to Millican Dam

NAME: LEONARD COX

AFFILIATION: Guardians of Navasota River

ADDRESS: Bryan Texas 77808

City | State | Zip

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

environmental impact

NAME: Luke Graham

AFFILIATION:

ADDRESS: Navasota TX 77868

City | State | Zip

Telephone | Fax | E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

For Environmental concerns

NAME: Paul Bannon

AFFILIATION: Guardians of the Navasota

ADDRESS: Bryan (City) TX (State) (Zip)

979-422-2252 (Telephone) | (Fax) | Paul@PaulBannon.com (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

Panther Creek

NAME:

AFFILIATION: Cathy Cox speaking for Dr. Jon Fleming

ADDRESS: (City) (State) (Zip)

(Telephone) | (Fax) | (E-Mail)

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

☑ I would like to speak on the following topics:

MILLICAN PROJECT

NAME: MIKE BRINKMANN

AFFILIATION: LAND OWNER

ADDRESS: 3903 LARKFIELD CT HOU TX 77059
City State Zip

832-309-0968 | 281 488 1613 | mike @ Brinkmann Roofing com
Telephone Fax E-Mail

PUBLIC HEARING SPEAKER INFORMATION
REGION H WATER PLANNING GROUP - Public Hearing, April 7, 2010

The Region H Water Planning Group welcomes public comment. If you wish to speak at today's public hearing, please provide the information requested on this card.

I would like to speak on the following topics:

The Millican Reservoir and why congress stopped its construction

NAME: Tom Ivy

AFFILIATION: Texas Stream Team

ADDRESS: 8007 Stroud Dr Houston TX 77036
City State Zip

713-774-0529 | | tomivy @ swbell.net
Telephone Fax E-Mail