Jefferson County Drainage District No. Six (DD6)

Jefferson County, Texas

Hazard Mitigation Plan

January 2005

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Executive Summary

Jefferson County Drainage District No. Six undertook development of this Hazard Mitigation Plan ("the Plan") because of increasing awareness that natural hazards, especially flood hazards, may affect many people and property in the area. The Plan is a requirement associated with receipt of certain federal mitigation grant program funds administered by the Texas Division of Emergency Management and the Texas Water Development Board. In addition, the Plan is a pre-qualification of eligibility for other mitigation funds.

The Plan was prepared by a Mitigation Planning Committee composed of staff representatives from Engineering, Operations, and Management. Staff from the City of Beaumont and Jefferson County contributed. A representative the Texas Water Development Board (TWDB) attended several of the planning meetings. State and federal agencies were notified and invited to attend.

The District has experienced number of flood events, most resulting in localized damage. Most bayous and streams in the District have some existing buildings that are at-risk to flood damage. It is estimated that over 10% of all buildings in the District are prone to some degree of flooding.

This Hazard Mitigation Plan sets the stage for long-term disaster resistance through identification of actions that will, over time, reduce the exposure of people and property to natural hazards. Sections of the Plan:

- Provide overviews of the hazards that threaten the District,
- Characterize the people and property that are exposed to some risk due to those hazards,
- Outline the planning process,
- Describe how hazards are recognized in the District's normal processes and functions, and
- Identify the priority of mitigation action items.

It is estimated that over 4,600 buildings and many more parcels of undeveloped land in the District are located in flood prone areas. There are 8,300 buildings in the District that are insured through the National

Flood insurance Program, (a number that exceeds the total number of buildings that plot as being "in" the mapped floodplain). This is an indication that many homeowners outside the floodplain are aware of the flooding risks throughout the area and have chosen to carry flood insurance, even though it is not required.

The final draft plan was presented at a public meeting and was made available for comment on the District's web site, in District facilities, and in public libraries. The final Plan was presented at a public meeting of the District's Board of Directors on January 11, 2005. Copies of the adopted plan are available for review at the District Office's located at 6550 Walden Rd, Beaumont, TX 77707.

Contact information for the District official submitting this plan is as follows:

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Resolution of Adoption

THE COUNTY OF JEFFERSON

JEFFERSON COUNTY DRAINAGE DISTRICT NO. 6

Agenda Item 6

RESOLUTION

BE IT REMEMBERED that at a meeting of the Board of Directors of Jefferson County Drainage District No. 6, of Jefferson County, Texas, at which a quorum was present held after proper notice according to law on the 11th day of January, 2005, on a motion made by Joshua Allen, Sr. and seconded by William Miranda, the following Resolution was duly adopted by vote of Board Members present and voting as follows:

Director Sam O. Smith	Aye
Director William F. Miranda	Aye
Director Joshua W. Allen, Sr.	Aye
Director Samuel P. Laday	Aye
Director James D. McNicholas	Aye

WHEREAS the areas supported by Jefferson County Drainage District No. 6 (DD6) have experienced natural hazards that result in public safety hazards and damage to private and public property; and

WHEREAS the hazard mitigation planning process set forth by the State of Texas and the Federal Emergency Management Agency offers the opportunity to consider natural hazards and risks, and to identify mitigation actions to reduce future risk; and

WHEREAS the Texas Water Development Board is providing federal mitigation funds to support development of the mitigation plan; and

WHEREAS a Hazard Mitigation Plan has been developed by the Mitigation Planning Committee; and

WHEREAS the Hazard Mitigation Plan includes a prioritized list of mitigation actions including activities that, over time, will help minimize and reduce safety threats and damage to private and public property, and

WHEREAS two public meetings were held on January 27, 2004, and September 14, 2004, to introduce the planning concept and to solicit questions and comment; and a public meeting was held on May 28, 2003, to present the Plan and request comments, as required by law,

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Jefferson County Drainage District No. 6 (DD6) that

1. The Hazard Mitigation Plan is hereby adopted as an official plan of DD6; minor revisions recommended by the Texas Governor's Division of Emergency Management, the Texas Water Development Board, and/or FEMA may be incorporated without further action.

2. The DD6 departments identified in the Plan are hereby directed to pursue implementation of the recommended high priority activities that are assigned to their departments.

3. Any action proposed by the Plan shall be subject to and contingent upon budget approval, if required, which shall be at the discretion of the Board of Directors, and this resolution shall not be interpreted so as to mandate any such appropriations.

4. The DD6 Assistant General Manager of Administration is designated to coordinate with other offices and shall periodically report on the activities, accomplishments, and progress, and shall prepare an annual progress report to be submitted to the Texas Division of Emergency Management and the Texas Water Development Board. The status reports shall be submitted by July 1 of each year.

ADOPTED this 11th day of January, 2005.

President

ATTEST: Secretary/Acting Secretary

Part 1
Introduction

1.1 Introduction

Jefferson County Drainage No. Six (DD6) undertook development of this Hazard Mitigation Plan ("the Plan") because of increasing awareness that natural and man-made hazards, especially flood hazards, may affect people and property in the area. The Plan is a requirement associated with receipt of certain federal mitigation grant program funds administered by the State Texas Governor's Division of Emergency Management and the Texas Water Development Board. In addition, the Plan is a pre-qualification of eligibility for other mitigation funds.

1.2 Authority

The District's Assistant General Manager and the Engineering Department were designated by the Board of Directors to coordinate with other appropriate District departments, as well as the City of Beaumont and Jefferson County, to facilitate the development of the Plan in conformance with state and federal guidelines.

Jefferson County Drainage District No. Six (DD6) is a conservation and reclamation district and a political subdivision of the State of Texas. DD6 was established January 21, 1920, after favorable vote on January 10, 1920.

It was extended and enlarged (Vol. 63, P.478) according to the authority of the 57th Legislature, Chapter 349, and Chapter 7, Title 128, Revised Civil Statutes of Texas, Art. 8129. Enlargement came about in 1961 thru legislation (HB 1063), which also established the District as a Conservation and Reclamation District under Section 59, Article XVI, Texas Constitution. DD6 was created primarily to provide drainage of overflow lands within DD6. DD6 is governed by a five member Board of Directors, appointed by the County Commissioners Court of Jefferson County, Texas (the Commissioners Court).

The Plan was prepared pursuant to the Flood Mitigation Assistance Program (44 CFR 78.6), the Hazard Mitigation and Pre-Disaster Mitigation Programs (44 CFR Parts 201 and 206), and the process outlined in materials prepared by the Federal Emergency Management

Agency for the Community Rating System of the National Flood Insurance Program.

1.3 Planning Area

All of the District's approximately 450 square miles lie wholly within Jefferson County and includes the City of Beaumont. The DD6 Hazard Mitigation Plan is prepared for the entire District. For a map of the planning area, see Figure 1-1.

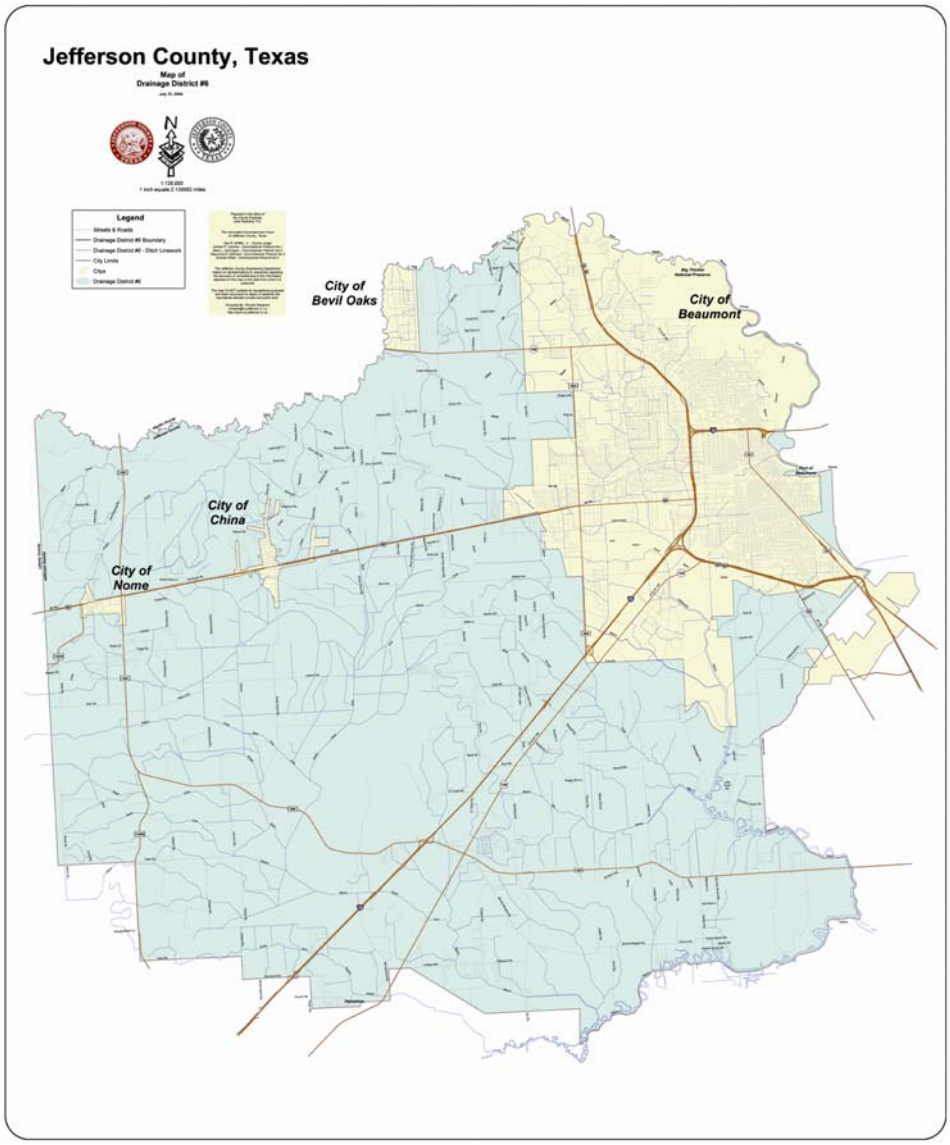

Figure 1-1. Map of DD6 Planning Area.

1.4 Geography, Climate, and Population

The area covered by Jefferson County Drainage District No. Six (DD6) is located in southeast Texas. Jefferson County is bounded on the north by the Neches River and Pine Island Bayou, which form the border with Hardin and Orange Counties; on the east by Sabine Lake, which forms the border with Cameron Parish, Louisiana; on the South by the Gulf of Mexico; and on the west by Liberty and Chambers Counties. The City of Beaumont is the County seat and the largest City of Jefferson County. The City is situated approximately 85 miles east of Houston, approximately 70 miles northeast of Galveston, and 275 miles southeast of Dallas (Figure 1-2). Ground surface elevations across the District vary from 37 feet to 3 feet above mean sea level. The topography is described as nearly flat prairie and the geologic structure is nearly flat strata. The bedrock types are comprised of deltaic sands and muds. Data from the Bureau of Economic Geology, at the University of Texas at Austin, identifies the land as "expansive clay and mud – locally silty, locally calcareous, flat to low; hilly prairie; commonly tilled".

The climate of the region is humid subtropical, with warm summers and moderate winters. Rainfall is abundant and on the average, evenly distributed throughout the year. The heaviest rains usually occur during the hurricane season, which extends from June through October. Average annual precipitation for the area is approximately 56 inches and the average annual temperature is about 69 degrees.

Figure 1-2. Vicinity Map: State of Texas

1.4.1 Population and Growth

Jefferson County, as a whole, has a total population of 252,051. The population density per square mile is 279 (statewide average is 79.6 persons per square mile). The population of unincorporated Jefferson County totals 30,701. The incorporated areas of Jefferson County are identified in Table 1-1, below. According to the State Demographer, the population projection for Jefferson County for 2005 is 256,052 (1.6% increase). The population of the labor force in Jefferson County is 108,633. The top three industries in the County are education, health, and social services with 23,338 workers; manufacturing with 13,798; and retail trade with 12,736 workers.

Table 1-1. Incorporated areas of Jefferson County.

City	Overall Population	Within DD6 Planning Area	Population within Planning area
Beaumont	**113,866**	**Yes**	**113,866**
Bevil Oaks	**1,346**	**Yes**	**1,346**
China	**1,112**	**Yes**	**1,112**
Nome	**515**	**Yes**	**515**
Groves	**15,733**	**No**	**N/A**
Nederland	**17,422**	**No**	**N/A**
Port Arthur	**57,755**	**No**	**N/A**
Port Neches	**13,601**	**No**	**N/A**
Total	221,350		116,324

The City of Beaumont has a population of 113,866 (2000 census). The population density per square mile is 1,339.4 (statewide average is 79.6 persons per square mile). The population of the labor force is 52,051. According to the Texas State Data Center and Office of the State Demographer, the Beaumont – Port Arthur Metropolitan Statistical Area is expected to expand in population from 385,090 in 2000 to 393,691 in 2005. The top five employers of the city include: Beaumont Independent School District with 2,927 employees, Christus St. Elizabeth Hospital with 2,600 employees, the US Postal Encoding Center with 2,023 employees, Lamar University with 1,700 employees, and Memorial Hermann Baptist Hospital with 1,500 employees. Beaumont is also home to Exxon-Mobil Oil, E.I. DuPont, and the Goodyear Tire and Rubber Company, which operate significant operations.

Table 1-2 shows the number of residential, and non-residential, distinguished between vacant and improved.

Table 1-2. Number of residential, and non-residential, distinguished between vacant and improved parcels.

	Residential	Non-Residential	Total
Vacant Parcels	12,606	948	13,554
Improved Parcels	43,896	3,629	47,525
Total	56,502	4,577	61,079

1.4.2 Special Consideration Communities

For the purpose of this plan, there are no jurisdictions within the DD6 area of responsibility that are classified as "special consideration communities." The federal government defines special consideration communities to be those with 3,000 or fewer individuals that is a rural community, and is not a remote area within the corporate boundaries of a larger community. According to the 2000 census data, just over 43,000 residents (17.4% of the entire county) were living below the poverty level. In 1998, the "federal poverty level" was defined as annual income of $8,040 (individual) and $16,450 (family of four).

1.5 Planning Committee Membership

The following District offices are designated members of the Mitigation Planning Committee:

- Administration – personnel, finance, and general management of the District
- Operations – general maintenance of District equipment, facilities, and infrastructure, and construction of new infrastructure
- Engineering – flood studies of problem areas, identification and engineering of mitigation alternatives, and coordination with maintenance and new construction

In addition to DD6 staff, City of Beaumont and Jefferson County had the following departments attend the committee members and provide valuable input:

- City of Beaumont
  - Floodplain Management
  - Streets and Drainage
- Jefferson County
  - Engineering

The following agencies were notified, invited to participate, and asked to review and comment on the Plan:

- Texas Division of Emergency Management
- Texas Water Development Board
- Federal Emergency Management Agency – Region VI
- Texas Parks & Wildlife
- Texas General Land Office
- Texas Commission on Environmental Quality

1.6 Acknowledgments

The Plan was supported by a planning grant provided by the Texas Water Development Board (TWDB). The District appreciates the advice and encouragement of TWDB throughout the plan development process.

The District's Hazard Mitigation Plan was facilitated by Jeffrey S. Ward & Associates, Inc., Naples, FL, with support from RCQuinn Consulting, Inc., Annapolis, MD.

1.7 Key Terms

For the most part, terms used in the Plan have the meanings that are commonly associated with them:

Disaster means the occurrence of widespread or severe damage, injury, loss of life or property, or such severe economic or social disruption that supplemental disaster relief assistance is necessary for the affected

political jurisdiction(s) to recover and to alleviate the damage, loss, hardship, or suffering caused thereby.

Federal Emergency Management Agency (FEMA) coordinates the federal government's efforts to plan for, respond to, recover from, and mitigate the effects of natural and man-made hazards.

Flood Insurance Rate Map (FIRM) is prepared by the Federal Emergency Management Agency to show Special Flood Hazard Areas; this map is the basis for regulating development according to the Regulations for Flood Plain Management.

Floodplain: See "Special Flood Hazard Area (SFHA)" below.

Hazard is defined as the natural or technological phenomenon, event, or physical condition that has the potential to cause property damage, infrastructure damage, other physical losses, and injuries and fatalities.

Mitigation is defined as actions taken to reduce or eliminate the long-term risk to life and property from hazards. Mitigation actions are intended to reduce the need for emergency response – as opposed to improving the ability to respond.

National Flood Insurance Program (NFIP), located within FEMA, is charged with preparing FIRMs, developing regulations to guide development, and providing insurance for flood damage.

Risk is defined as the potential losses associated with a hazard. Ideally, risk is defined in terms of expected probability and frequency of the hazard occurring, people and property exposed, and potential consequences.

Special Flood Hazard Area (SFHA) or **Floodplain** is the area adjoining a river, stream, shoreline, or other body of water that is subject to partial or complete inundation. The SFHA is the area predicted to flood during the 1% annual chance flood, commonly called the "100-year" flood.

1.8 Acronyms

The following acronyms are used in the document:

CRS – Community Rating System (NFIP)

GDEM – Texas Governor's Division of Emergency Management

FEMA – Federal Emergency Management Agency

FIRM – Flood Insurance Rate Map

FIS – Flood Insurance Study

FMA – Flood Mitigation Assistance (FEMA)

GIS – Geographic Information System

HMGP – Hazard Mitigation Grant Program (FEMA)

NFIP – National Flood Insurance Program (FEMA)

NOAA – National Oceanic and Atmospheric Administration

PDM – Pre-Disaster Mitigation Program (FEMA)

SFHA – Special Flood Hazard Area

TCEQ – Texas Commission on Environmental Quality

TWDB – Texas Water Development Board

JCDD6 – Jefferson County Drainage District No. Six

1.9 References

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Part 2
Introduction to Mitigation Planning

2.1 Introduction

An important step in the lengthy process of improving resistance to hazards is the development of a hazard mitigation plan. The DD6 Hazard Mitigation Plan was prepared in accordance with the guidelines provided by the Federal Emergency Management Agency, advice from the Texas Governor's Division of Emergency Management and the Texas Water Development Board (TWDB), and steps outlined in guidance documents for the National Flood Insurance Program's (NFIP) Community Rating System (see Section 2.4).

The Hazard Mitigation Plan serves several purposes. It sets the stage for long-term disaster resistance through identification of actions that will, over time, reduce the exposure of people and property to hazards. Further, the Plan may establish eligibility for certain mitigation grant funds.

Sections of the Plan provide overviews of the natural hazards that threaten the District, the people and property exposed to those hazards, the planning process, how hazards are recognized in the District's normal processes and functions, and priority mitigation action items. The hazards summary and disaster history help to characterize future hazards. When taking into account the magnitude of past events, the number of people and properties affected, and the severity of damage, flood hazards clearly are the most significant natural hazard to threaten the District. Therefore, this Plan concentrates primarily on flood hazards.

This Plan acknowledges that many buildings were built before the creation of the National Floodplain mapping system. Current regulations require new development to recognize reasonably anticipated flood hazards. Older buildings, then, may reasonably be expected to sustain more property damage than new buildings.

2.2 The Mitigation Planning Process

DD6 followed a well-established planning process to develop this Hazard Mitigation Plan and to fulfill multiple requirements. Five meetings of the

Mitigation Planning Committee were held (summary notes from meetings are in Appendix A):

November 19, 2003. Overview of the mitigation planning process, prevalent natural hazards, losses and costs associated with events, discussion of opportunities for public comment, and introduction to examples of mitigation actions.

January 22, 2004. Review of public questionnaire draft, discussion of ways the District communicates with the public, overview of what we know about flood (and other) hazards and how we will learn more, drafting a mitigation goal statement, and discussion of possible mitigation actions.

February 24, 2004. Review of updated public questionnaire draft and discussion on its distribution, review of interview notes, review and approval of the mitigation goal statement, and development of possible mitigation actions.

May 5, 2004. Update of public questionnaire responses, review of mitigation action ranking, linking mitigation actions to elements of the goal statement, and review of communication flyer.

August 5, 2004. Review of GIS based maps, overview of plan contents, discussion of open items, discussion of public meeting time and presentation, approval of draft plan release for public review.

The overall mitigation planning process, summarized below, was facilitated by a mitigation planning consultant:

Get Organized: DD6's Assistant General Manager and Engineering Department were charged by the board with coordinating a committee comprised of District departments (and input for City of Beaumont and Jefferson County).

Coordinate: Prior to the first Committee meeting, the following agencies were notified of the planning activity and invited to participate:

- Texas Governor's Division of Emergency Management, Texas Water Development Board, and the Texas Commission on Environmental Quality (which coordinates the National Flood Insurance Program).

- FEMA Region VI, U.S. Army Corps of Engineers - Galveston District, and the Natural Resource Conservation Service.

Identify Hazards: Interviews were conducted to understand how members of the Committee perceive the impacts past events have had and how hazards are incorporated into routine responsibilities (detailed notes on the interviews are on file with the District). Maps can be used to show hazard-prone areas when hazards are defined with sufficient detail to show spatial or geographic differences in impact. Flood hazards are the most easily identified, due to the availability of Flood Insurance Rate Maps for area. There are not enough geographic differences within the area to suggest that high winds or tornadoes might affect one area more severely or more frequently than other areas. There are no dams within the District or outside the District that affect the District's watersheds, therefore, dam failure is not a threat. Hazardous materials are generally confined to fixed facilities or within defined transportation corridors; thus, maps can be prepared to show anticipated impact areas.

Review How Hazards are Addressed: During interviews with the Mitigation Planning Committee representatives, the roles of each program were described with respect to whether and how hazards are included in routine functions. The results are summarized in Section 6.

Assess Risks: For the purpose of this Plan, site-specific and detailed risk assessments were not prepared. The best floodplain mapping information available is from the Flood Insurance Study and associated Flood Insurance Rate Maps, dated 2002.

Create Goal Statement: The mitigation goal statement was discussed during the second meeting of the Committee, and approved at the third meeting.

Review Mitigation Actions: A list of tentative mitigation actions was prepared based on meetings and interviews as well as knowledge of successful actions implemented in other communities. The list was distributed to the Committee and discussed in some detail during the third meeting. Minor changes were made and a revised list was distributed to the Committee, and members were asked to indicate priorities (Drop, No Opinion, Low, Medium, High) based on their program's functions and priorities. The priorities were compiled into the list shown in Part 7.

Draft Action Plan: Information collected and notes from meeting discussions were compiled into a format designed to fulfill various planning requirements. The draft was circulated to Mitigation Planning Committee members and electronic copies were provided to adjacent communities and pertinent state and federal agencies. Comments were collected and incorporated and a final draft was circulated.

Hold Public Meetings: In August 2004, the draft Hazard Mitigation Plan, including proposed mitigation actions, was made available for public review. A public meeting was held on September 15, 2004 to address any public comments or questions on the draft plan. The final Plan was presented for adoption at the January 11, 2005 DD6 Board Meeting.

Adopt Plan: A copy of the resolution of adoption is bound into this Plan.

2.3 Public Involvement in Mitigation Planning

Consistent with the District's standard objective to inform and involve citizens, and to fulfill the public involvement requirements of the mitigation planning programs, the District solicited input and notified and invited residents to review the Plan and attend a public meeting.

2.3.1 Public Work Session at Board Meetings

Two Board of Director's public work sessions were held during the planning process, on January 27, 2004 and September 14, 2004. The work session on January 27th included an overview of the mitigation planning process and progress to date. As with all work sessions, this meeting was open to the public and a notice of the meeting was posted. Specific items covered in this work session presentation included:

- How and why the District is undertaking the mitigation planning process;
- Overview of the area's natural hazards;
- Proposed public involvement; and
- The schedule for completion.

The work session on September 14, 2004 included an update of progress made since the January 2004 work session, an update on public questionnaire responses, and a preview of the public meeting presentation. As with all work sessions, this meeting was open to the public and a notice of the meeting was posted. Specific items covered in this work session presentation included:

- Overview of Grant programs from which DD6 has received prior grants;
- Specifics on public involvement to date and upcoming;
- Overview of the Mitigation Goal Statement;
- Overview of specific Mitigation Action Items identified by the team; and
- Next steps in the planning, review, and approval process.

2.3.2 Public Questionnaire

A questionnaire to solicit input from citizens about hazards and mitigation ideas was prepared and distributed to over 1,500 people. The questionnaire was posted on the District's web page (Appendix B, including a summary of responses). 166 homeowners returned completed questionnaires by mail and another 27 homeowners completed the questionnaire on-line. Excerpts from the homeowner responses include:

- Ditches need to be dug deeper and new drainage systems installed
- Drainage system needs to be improved
- Need larger drainage pipes
- Flooding seems to be happening more often now than it did before
- Flooding in the North end of Beaumont seems to be worsening
- Too much concrete is being put down – water has no place to go
- Streets throughout the area flood even during small storms
- There seems to be an increase in runoff due to development
- Pine Island Bayou needs to be dredged
- There is a great deal of debris in Pine Island Bayou
- Drainage to Pine Island Bayou needs to be improved
- Storm drains must be kept free of debris
- Drainage ditches must be better maintained

- The Drainage District should plan for new drainage with the developers so development does not cause flooding in other areas
- Highways and railroads should not be allowed to block the natural floodplain
- New houses being built at higher elevations than existing houses increasing flooding in these older houses
- St. Elizabeth Hospital's emergency room has experienced significant flood damage
- When it rains a lot the sewer systems seems to backing up – can't use plumbing and/or backing up into yards and houses

2.3.3 Final Public Meeting

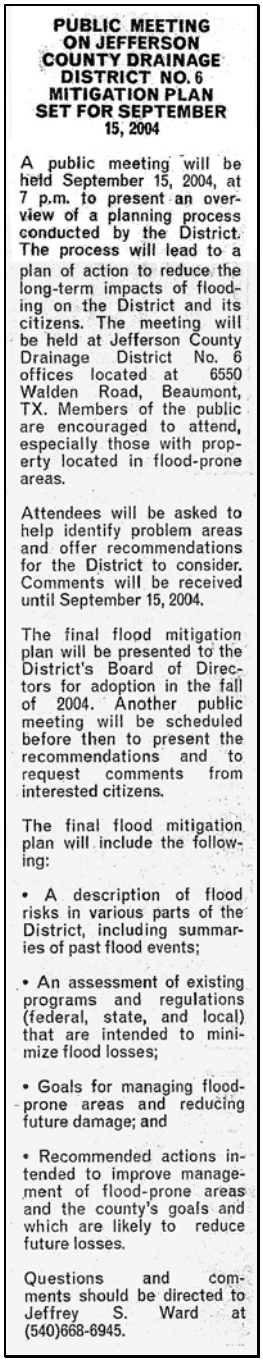
The DD6, Hazard Mitigation Plan (Public Review Draft) was presented to the public at a meeting held on September 15, 2004. Notices of the meeting were published in the Beaumont Enterprise. A notice of the final public meeting was published in the Legal Notice section on August 29, 2004; and on September 5, 2004, (Figure 2-1).

Prior to the meeting, copies of the Public Review Draft were made available to the public at DD6' offices and at the City of Beaumont public library. In addition, it was posted online at www.DD6.org.

Public comments were taken into account when preparing the final plan and, where relevant, were incorporated into the draft.

2.3.4 Public Session of the DD6 Board Meeting

The Hazard Mitigation Plan was presented for adoption during the January 11, 2005 public session of the DD6 Board of Director's meeting and adopted effective immediately. The plan was



PUBLIC MEETING ON JEFFERSON COUNTY DRAINAGE DISTRICT NO. 6 MITIGATION PLAN SET FOR SEPTEMBER 15, 2004

A public meeting will be held September 15, 2004, at 7 p.m. to present an overview of a planning process conducted by the District. The process will lead to a plan of action to reduce the long-term impacts of flooding on the District and its citizens. The meeting will be held at Jefferson County Drainage District No. 6 offices located at 6550 Walden Road, Beaumont, TX. Members of the public are encouraged to attend, especially those with property located in flood-prone areas.

Attendees will be asked to help identify problem areas and offer recommendations for the District to consider. Comments will be received until September 15, 2004.

The final flood mitigation plan will be presented to the District's Board of Directors for adoption in the fall of 2004. Another public meeting will be scheduled before then to present the recommendations and to request comments from interested citizens.

The final flood mitigation plan will include the following:

• A description of flood risks in various parts of the District, including summaries of past flood events;

• An assessment of existing programs and regulations (federal, state, and local) that are intended to minimize flood losses;

• Goals for managing flood-prone areas and reducing future damage; and

• Recommended actions intended to improve management of flood-prone areas and the county's goals and which are likely to reduce future losses.

Questions and comments should be directed to Jeffrey S. Ward at (540)668-6945.

Figure 2-1. Public Meeting Notice.

forwarded to the Texas Water Development Board and the Texas Division of Emergency Management for appropriate review and action.

2.4 The State Mitigation Plan

The State of Texas has long been aware that it is exposed to a variety of natural hazards. Of particular concern are flood hazards associated with thunderstorms, hurricanes, and tropical storms. The State of Texas Hazard Mitigation Plan (January 2000; accessible online at http://www.txdps.state.tx.us/dem) was reviewed and is summarized below.

Originally prepared by the Texas Division of Emergency Management to fulfill the requirements set forth by Congress in the Stafford Act (Section 409), the State's Hazard Mitigation Plan will be reviewed and revised to satisfy new planning requirements prompted by the Disaster Mitigation Act of 2000.

The State's plan acknowledges that people and property in Texas are at risk from a variety of hazards that have the potential to cause widespread loss of life and damage to property, infrastructure, and the environment. The plan "establishes hazard mitigation goals, strategies, and specific measures designed to reduce the occurrence or severity of the consequences of hazards." It also documents procedures for implementation and administration of certain mitigation grant programs.

The State Hazard Mitigation Team is designated to coordinate and influence mitigation and is composed of several agencies that participate on the Emergency Management Council. Primary agencies are the Texas Department of Housing and Community Affairs; Texas Parks and Wildlife Department; Texas Department of Environmental Quality (formerly the Texas Natural Resource Conservation Commission); Texas Department of Transportation, General Land Office; Railroad Commission of Texas; Texas Department of Insurance; Texas Forest Service; Texas Engineering Extension Service; and Texas Division of Emergency Management. Brief summaries of each of these primary agencies are provided, noting key natural hazard mitigation measures

associated with each agency. For the most part, existing measures are ongoing agency functions and responsibilities.

As currently structured, the State's Hazard Mitigation Plan contains attachments outlining specific strategies for dealing with hazards related to floods, wildfires, and tornadoes. Strategies particularly pertinent to local jurisdictions are described below:

- **Flood Mitigation.** Eleven percent of the state's land area is mapped as flood-prone, with an estimated 675,000 households located in these areas. Mitigation recommendations include:
  - Passage by the Texas Legislature of new laws that create/mandate sound floodplain management by all political subdivisions.
  - That all owners of dams, levees, floodwalls and other protective works conduct studies to evaluate effectiveness and soundness and to incorporate evacuation and warning into operations plans.
  - Implementation of a statewide information and education program, with local emphasis, to address sale of flood insurance and public awareness.
  - Seek broader authority to protect, restore, and preserve natural and cultural floodplain resources.
- **Wildfire Mitigation.** In an average year, 1.5 million acres burn in Texas. Many areas are vulnerable to wildfire during dry years, although those with very sparse vegetation are less likely to burn due to low quantities of fuel. Mitigation recommendations include:
  - Development of a statewide wildfire reporting system.
  - Establishment of mutual aid agreements and improvements in training.
  - Installation of automated weather systems at key locations.
  - Assistance to rural communities via centralized purchasing and development of dry hydrants.
- **Tornado Mitigation.** Texas tornadoes occur with greatest frequency during the spring and early summer months, with the majority occurring in April, May, and June. Mitigation recommendations include:
  - Promotion of expanded normal peril and windstorm insurance.
  - Promotion of enhanced public awareness.
  - Adoption and enforcement of building codes and/or design criteria, especially for shelters in public facilities, schools, and mobile home parks.

– Enhancement of warning capabilities to ensure that +90% of the state's population receives accurate and timely warnings to allow adequate response.

2.5 Federal Mitigation Planning Requirements

Requirements for mitigation planning are set forth in four programs administered by the Federal Emergency Management Agency. These are described below. Although slightly different, all programs outline the same basic planning process (described in Section 2.1). The District Plan is intended to satisfy the basic requirements each of the four programs:

- **Flood Mitigation Assistance Program.** To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a mitigation plan. The plan must include specific elements and be prepared following the process outlined in the NFIP's Community Rating System.
- **Hazard Mitigation Grant Program.** By November 2004, to qualify for post-disaster mitigation funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA.
- **Pre-Disaster Mitigation Grant Program.** By November 2003, to qualify for pre-disaster mitigation funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA.
- **NFIP's Community Rating System (CRS).** The CRS offers recognition to communities that exceed minimum requirements of the National Flood Insurance Program. Recognition comes in the form of discounts on flood insurance policies purchased by citizens. The CRS offers credit for mitigation plans that are prepared according to a multi-step process.

Part 3
Mitigation Goal Statements

3.1 Introduction

State and federal guidance and regulations pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards. Mitigation goals have been established by the Federal Emergency Management Agency, the Texas Division of Emergency Management, and DD6.

3.2 DD6's Mitigation Goal

As required by the planning process, the Mitigation Planning Committee developed a goal statement. To do so, the Committee reviewed FEMA's national mitigation goals, several examples of goal statements from other states and communities, and the State of Texas' Mitigation Goal. The committee also considered information about natural hazards that may occur in the area and their potential consequences and losses. The final mitigation goal statement is as follows:

DD6's Mitigation Goal Statement

The mitigation goals of the District are:

- To protect public health, safety, and welfare;
- To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
- To facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems; and
- To seek solutions to existing problems.

The Mitigation Planning Committee discussed the value of making the goal statement broad enough to allow for a more comprehensive interpretation of its phrasing, for example:

- "Facilitate the development review and approval process" can include developing and adopting a District-wide Master Drainage Plan allowing the District to take advantage of Texas House Bill 919.

- "Public Awareness" can include helping citizens to understand hazards, to know how to respond when asked to evacuate, to learn how to protect themselves and their property, to understand the value of flood insurance, and to obtain and comply with permit requirements.

3.4 State of Texas Mitigation Goals

The Texas Governor's Division of Emergency Management (GDEM) is designated by the Governor as the state's coordinating agency for disaster preparedness, emergency response, and disaster recovery assistance. GDEM also is tasked to coordinate the state's natural disaster mitigation initiatives and administer grant funding provided by the Federal Emergency Management Agency. A key element in that task is the preparation of the State of Texas Hazard Mitigation Plan (Rev 2, 2000). The State's plan includes a series of mitigation goals, as follows:

Texas State Mitigation Goals

- Reduce or eliminate hazardous conditions that cause loss of life;
- Reduce or eliminate hazardous conditions which inflict injuries;
- Reduce or eliminate hazardous conditions which cause property damage; and
- Reduce or eliminate hazardous conditions which degrade important natural resources.

Texas Hazard Mitigation Plan (2000)

3.5 FEMA's Mitigation Goal

FEMA's mitigation strategy is set forth in a document originally prepared in the late 1990s. This strategy is the basis on which FEMA implements mitigation programs authorized and funded by the U.S. Congress. The national mitigation goal statement is as follows:

- To engender fundamental changes in perception so that the public demands safer environments in which to live and work; and
- To reduce, by at least half, the loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural disasters.

Part 4
Hazards in the District

4.1 Introduction

As part of its efforts to support and encourage hazard mitigation initiatives, the Texas Division of Emergency Management prepared an assessment of hazards that have caused or have the potential to cause disaster situations in communities throughout the State of Texas. Results of the study are found in the State of Texas Hazard Assessment (2000). Other public sources of information provide some information about natural hazards and past events. Of the 68 Presidential Disaster Declarations that Texas received between 1961 and 2003, 37 were for floods, 14 for tornadoes, 12 for hurricane/tropical storms, one for winter storm, and four were designated "other."

The following subsections provide an overview of past hazard events and associated losses. Natural hazards other than flood hazards that are deemed pertinent to the District are described, along with summary statements about exposure to risks associated with those hazards. Because flooding poses the most significant risk in the District, Part 5 outlines flood hazards, past flood events, and summaries of the people and property that are at-risk.

4.2 Overview of Risks

Damage and losses (including physical damage, indirect and economic losses, and injuries and deaths) that are associated with hazards result when an event affects areas where people and improved property are located. After hazards are identified, then estimates of how exposed people and property are (how "at-risk") can be prepared, especially if the hazards can be characterized by areas on a map.

When the full range of possible natural and man-made hazards is reviewed, it becomes apparent that some events occur frequently and some are extremely rare. Some hazards impact large numbers of people to a limited degree, while others may cause very localized but very significant damage. As described in Section 5.1, floods have historically caused the most property damage in the District.

According to the National Oceanic Atmospheric Administration (NOAA) database, between 1950–2002, Jefferson County has experienced 164 severe thunderstorms (46 of which had greater than 50 knot winds), 98 tornadoes (42 F0s, 30 F1s, 20 F2s, and 6 F3s), 5 severe droughts, 82 hail storms (49 of which had greater then 1" diameter hail), 5 hurricanes, 4 tropical storms, 2 extreme heat waves, 1 extreme cold event, 1 ice storm, 6 significant lightning event, 1 wildfire, 2 high wind events, and 25 floods/flash floods. A number of these events caused property damage and loss of life. The NOAA database indicates that have been eight deaths as a result of these events. (Reference NOAA database and "Major and Catastrophic Storms and Flooding in Texas", by Raymond M. Slade, Jr. and John Patton, U.S.G.S. Open-file Report 03-193).

4.2.1 Weather-Related Deaths

The National Weather Service maintains data on weather-related deaths. Summary statistics for the State of Texas based on those data are provided in Table 4-1. Because the reporting periods are different, percentages, not actual numbers, are provided.

Table 4-1

Texas Weather-Related Deaths
(as percent of all weather-related deaths).

Hazard	Statewide (1989–2000)	Jefferson County (1989–2002)
Flood/Flash Flood	35%	12.5%
Tornado	10%	37.5%
Lightning	8%	25%
Winter Storm/Ice Storm	6%	12.5%
Extreme Heat	34%	0%
Severe Thunder Storm	4%	12.5%
Hurricane/Tropical Storm	3%	0%

4.3 Public Awareness of Hazards & Risk

The public becomes aware of local hazards in a number of ways. For example, public awareness of flood hazards is enhanced during the following activities:

- Buying property in a floodplain triggers the federal requirement to obtain flood insurance when obtaining a federally insured and regulated mortgage. Federally insured and regulated mortgage lenders are required to make homebuyers purchase flood insurance if the building is located in a mapped flood hazard area. Buyers are supposed to be notified well in advance of closing.
- Applying for permits leads to a determination that the property or construction site is within a mapped floodplain and therefore subject to floodplain management requirements.
- When flooding occurs the news media frequently carries stories about travel hampered by flooded roads and homes damaged by floodwaters. Research has shown that many flood victims themselves tend to discount the likelihood that flooding will occur again. This tendency is attributed to a general lack of understanding of probability (see Comparing Risks, below). All too often, people interpret the phrase "100-year storm" to mean that it only occurs once every 100 years, rather than that such an event has a 1-in-100 chance of happening each year. FEMA reports that, based on insurance statistics, a building in the floodplain is five times more likely to be damaged by flood than to sustain major damage by fire.
- Flood warnings reach the public as regional warnings from the National Weather Service.

Comparing Risks

What's the chance that in the next year, a person whose house is in the floodplain will:

- Be involved in a car accident? 3 chances in 100
- Be in 100-year flood? 1 chance in 100
- Have a car stolen? 1 chance in 300
- Be a victim of robbery? 1 chance in 1,000
- Have a residential fire? 4 chances in 10,000

www.floodsafety.com
a project of the Texas Environmental Center

4.4 Overview of DD6's Natural Hazards History

Numerous federal agencies maintain a variety of records regarding losses associated with natural hazards. Unfortunately, no single source is considered to offer a definitive accounting of all losses. The Federal Emergency Management Agency maintains records on federal expenditures associated with declared major disasters. The U.S. Army Corps of Engineers and the Natural Resources Conservation Service collect data on losses during the course of some of their ongoing projects and studies. Additionally, the National Climatic Data Center of the National Oceanographic & Atmospheric Administration (NOAA) collects and maintains certain data in summary format, indicating injuries, deaths, and costs. The basis of the cost estimates, however, is not identified (Reference: NOAA, online).

In the absence of definitive data on some of the natural hazards that may occur in the District, illustrative examples are useful. Table 4-2 provides brief descriptions of particularly significant natural hazard events occurring in the District's recent history. This list is not meant to capture every event that has affected the area, rather lists one or two examples of the types of events than have affected the area in the past.

Data on Presidential Disaster Declarations characterize some natural disasters that have affected the area. In 1965, the federal government began to maintain records of events determined to be significant enough to warrant declaration of a major disaster by the President of the United States. Presidential Disaster Declarations are made at the county level and are not specific to any one city or sub-area, such as the District. Given that DD6 is responsible for drainage in a large portion of Jefferson County, it is likely that a disaster declarations for Jefferson County affected the District in some way. Between 1965 and 2003 twelve such disasters have been declared in Jefferson County and are identified in Table 4-2.

Table 4-2

Natural Hazard Events and Declared Major Disasters in Jefferson County.

Date & Disaster (DR)	Nature of Event
11/7/57	**TORNADO (F3) –** An F3 tornado touched down in Jefferson County. This tornado was 200 yards wide and stayed on the ground for 4 miles causing $2.5M in damages, 2 deaths, and 59 injuries.
6/29/73 (DR 393)	**SEVERE STORMS AND FLOODING –** a massive storm hit the Houston Texas area dumping 10 – 15 inches of rain. In total the storm resulted in 10 deaths and over $50M in damage.
4/26/79 (DR 580)	**SEVER STORMS, TORNADOES, AND FLOODING** – (Nearly 300 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $2.8 M in payments). Rainfall reported in amounts between 9.56 to 10.7 inches in the Beaumont area and 11.5 inches in Bevil Oaks are, flooded many communities along the Necehes river and Taylor, Pine Island, and Hillebrandt Bayous. Pine Island crested at 34.29 feet at Sour Lake, surpassing a record 31 feet set in 1917. Many homes, businesses and roads in the area were damaged.
7/28/79 (DR 595)	**STORMS AND FLASH FLOODS -** (Over 100 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $700K in payments). Tropical Storm Claudette formed in the Central Atlantic the morning of July 15, 1979. It never reached hurricane intensity as it wandered across the northern Caribbean, and the Gulf of Mexico 10 days, making landfall near Port Arthur the evening of the 24th. Rainfall was estimated at 11 inches in the Beaumont area. The area suffered severe wind damage to utilities.
9/26/80 (DR 632)	**TROPICAL STORM DANIELLE** - (Over 200 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $1.5M in payments). Rains of 8-9 in. fell on most of Texas. Particularly hard hit were Fisher, Mitchell, Nolan, and Scurry Counties.
5/31/89 (DR 828)	**SEVERE STORMS, TORNADOES AND FLOODING -** (28 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $500K in payments). Widespread rains caused flooding that resulted in five deaths and total damages of about $50 million. The storm dumped between 10 and 15 inches of rain in the southeast Texas area. Homes in Bevil Oaks flooded.
7/18/89 (DR 836)	**TROPICAL STORM ALLISON** - (Over 400 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $3.8M in payments). Tropical Storm Allison caused torrential rains of 10-15 in. from Houston to Beaumont. Houston Intercontinental Airport recorded 10.34 in. during 24 hours. The storm resulted in three deaths and over $60M in damages.

Table 4-2

Natural Hazard Events and Declared Major Disasters in Jefferson County.

Date & Disaster (DR)	Nature of Event
11/15/94 (DR 1041)	**SEVERE THUNDERSTORMS AND FLOODING** - (Over 200 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $5.5M in payments). A tropical, mid-latitude rainfall of unusual proportion on a 30- to 35-county area of southeast Texas resulted in catastrophic flooding. The intense rainfalls totaled more than 25 in. at several locations and more than 8 in. on much of southeast Texas. The storm resulted in 18 deaths and an estimated $700M in damages.
5/96	**DROUGHT** - Drought conditions continued across southeast Texas. Rainfall totals from January through May averaged 10 to 15 inches below normal. The main areas affected include farming and fire protection. Crop damage across the entire region exceeded 1 million dollars.
8/12/96	**SEVERE LIGHTNING** - As many as 9,000 lightning strikes this evening resulted in one man injured, one house fire, and several telephone poles damaged.
1/14/97	**ICE STORM** - A record ice storm paralyzed southeast Texas and southwest Louisiana. Around 90,000 electric customers across southeast Texas were without power for up to six days. Emergency shelters were opened for several nights due to the cold weather following the ice storm. More trees and power lines were knocked down in this ice storm than what came down during Hurricane Bonnie in 1986. Hundreds of homes received minor damage due to trees or tree limbs falling on roofs. Several house fires were directly or indirectly related to the ice storm, but fortunately there were only no injuries. Numerous traffic accidents attributed to icy roads led to several minor injuries. One death was indirectly attributed to the ice storm. Two men were electrocuted on Tuesday, January 21st, while doing cleanup work for a local electric company. One 48 year old man died, and a 19 year old man was seriously injured in the accident
8/26/98 (DR 1239)	**TROPICAL STORM CHARLEY** – (Limited damage in Jefferson County) Up to 16 in. of rainfall in south-central Texas caused flooding in many counties, to include Jefferson
10/14/98 (DR 1245 & 1257)	**HURRICANE GEORGES** - (23 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $200K in payments). Tropical Storm Frances, and a localized thunderstorm that followed later in the same month, resulted in widespread flooding.
8/31/2000	**EXTREME HEAT** - Record heat occurred in late August across southeast Texas. At the Southeast Texas Regional Airport, the all-time record high of 108 was tied on August 31st. Previously it had been achieved on July 14 1902.

Table 4-2

Natural Hazard Events and Declared Major Disasters in Jefferson County.

Date & Disaster (DR)	Nature of Event
6/9/01 (DR 1379)	**TROPICAL STORM ALLISON -** (Nearly 500 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $12 M in payments). Tropical Storm Allison produced flooding throughout Southeast Texas, Louisiana, and across the eastern United States. Damages were estimated at $5 Billion and prompted a Presidential disaster declaration for 30 counties in Texas.
10/29/02 (DR 1439)	**SEVERE STORMS, TORNADOES AND FLOODING** – (Over 400 Jefferson County/City of Beaumont policy holders filed flood claims resulting in over $8.7M in payments). This unnamed storm produced heavy rains, causing flooding throughout Jefferson County.

4.5 Losses Due to Major Disasters

No definitive record exists of all losses – public and private – due to disasters for Jefferson County. For the United States as a whole, estimates of the total public and private costs of natural hazards range from $2 billion to over $6 billion per year. Most of those costs can only be estimated. In most declared major disasters, the federal government reimburses 75% of the costs of cleanup and recovery, with the remaining 25% covered by the state and affected local jurisdictions.

The Federal Emergency Management Agency's estimate of its expenditures in the State of Texas for flood disasters alone for the period from 1991 through 2001 exceeds $6.8 billion. This period includes Tropical Storm Allison, which inflicted damages in excess of $1 billion statewide. These costs, which do not include costs incurred by other federal agencies or by state and local agencies, include those associated with:

- Public assistance for debris removal, emergency services, roads and bridges, flood control facilities, public buildings and equipment, public utilities, and parks and recreational facilities.

- Assistance paid out for individual and family grants, emergency food and shelter, and other assistance to individuals.
- Funds set aside to support hazard mitigation grants.

DD6 received $145,000 public assistance funds for infrastructure repair and clean up following Tropical Storm Allison in 2001.

DD6 has received federal hazard mitigation funds to support mitigation initiatives:

- $73,575 for the buyout of one homes damaged in 2002 (DR 1439) (see Section 6.6.3);
- $671,000 in Flood Mitigation Assistance program funds for the Gulf Terrace Detention project; and
- $30,000 in Flood Mitigation Assistance program funds to support development of the flood mitigation plan.

In addition to the above, DD6 has received a $330,000 grant from the Texas Water Development Board to complete a comprehensive engineering study of the Hillebrandt Bayou watershed.

4.6 Hazards Other than Flood

The Mitigation Planning Committee considered hazards that may affect the District. For the most part, hazards other than flooding are not considered to be significant risks. The following sections describe these other hazards and how they have affected the District.

4.6.1 High Winds/Tornadoes

Several meteorological conditions can result in winds severe enough to cause property damage. High winds have been associated with extreme hurricanes traveling inland, tornadoes, and locally strong thunderstorms. Thunderstorms are the by-products of atmospheric instability, which promotes vigorous rising of air particles. A typical thunderstorm may cover an area three miles wide. The National Weather Service considers a thunderstorm "severe" if it produces tornadoes, hail of 0.75 inches or more in diameter, or winds of 58 miles per hour or more. Structural wind damage may imply the occurrence of a severe thunderstorm.

Figure 4-1 shows the "basic wind speed" map from the International Building Code. This map is used to design buildings to withstand reasonably anticipated winds in order to minimize property damage (reference: ASCE 2002). The District falls within the area where the "design wind" speed is 110 miles per hour.

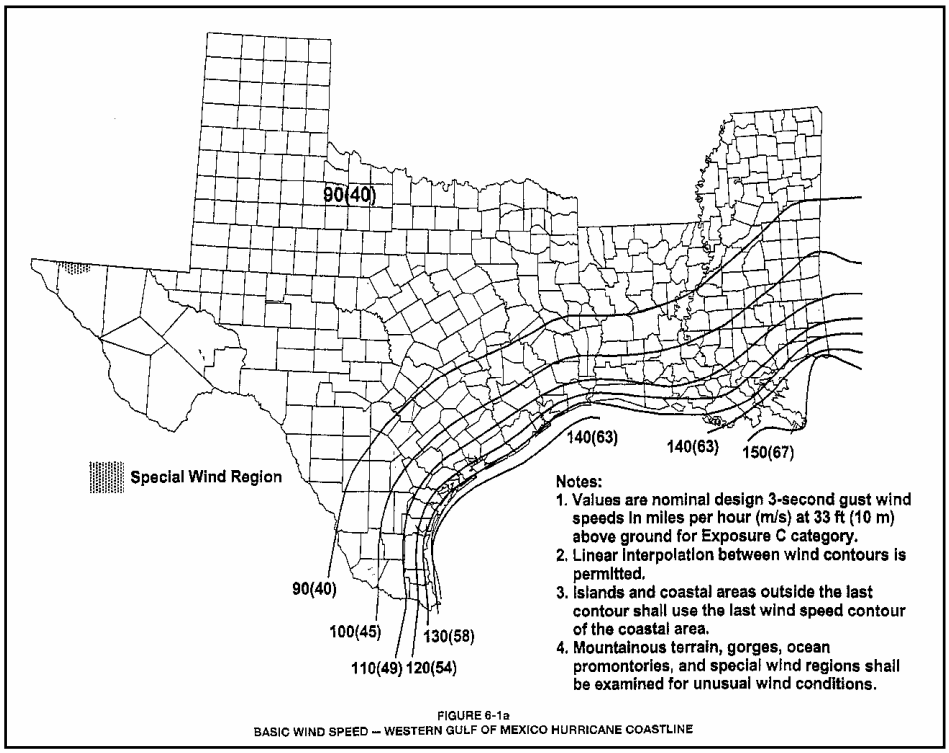


Figure 4-1. Basic Wind Speed: Texas.

Tornadoes pose a significant threat to life and safety in the District. The National Weather Service defines a tornado as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm. Tornadoes can form any time of the year; but the season of greatest activity runs from March to August.

Figure 4-2 illustrates the frequency of tornado strikes in the U.S. per 1,000 square miles. With an average of 153 tornadoes touching down each year, Texas is considered the U.S. "tornado capital." While Texas tornadoes can occur in any month and at all hours of the day or night, they occur with greatest frequency during the late spring and early

summer months during late afternoon and early evening hours. Northern Texas is most vulnerable, but the area around the District experiences considerable activity.

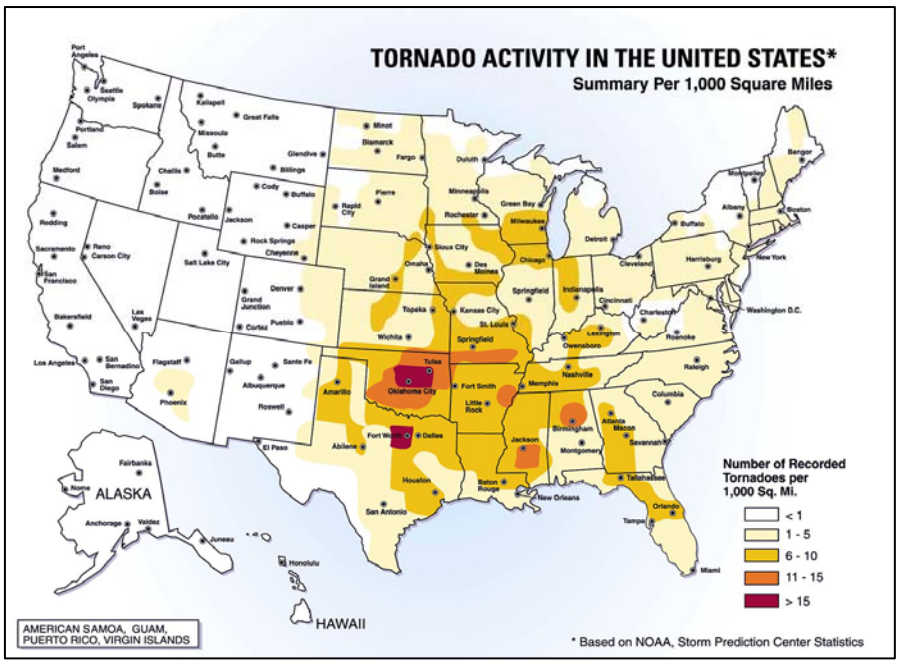


Figure 4-2. Tornado Activity in the U.S.

In the District, According to the National Oceanic Atmospheric Administration (NOAA) database, between 1950–2002, Jefferson County has experienced 46 severe thunderstorms with greater than 50 knot winds and 98 tornadoes (42 F0s, 30 F1s, 20 F2s, and 6 F3s). Most wind damage has been limited to downed trees, blocked roads, and disabled power lines. There have been three weather-related deaths associated with tornadoes, and 1 associated with lightning and severe thunderstorms combined. The building code administered within the incorporated areas of Jefferson County require all new construction to be designed and constructed for 110 mile per hour wind loads.

Within the District, High Winds/Tornadoes risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence across the entire District. As

listed in Table 4-3, all people and assets are considered to have the same degree of exposure.

Table 4-3

Buildings/Infrastructure.

Type	Number of Structures/Estimated Value	
People	109,740*	
Residential Buildings	43,896	$3,144,219,948**
Commercial Buildings	3,629	$2,147,992,530**
District owned Buildings	13	$1,655,053***
Infrastructure	830	$139,607,360**
Total		$5,524,318,618

* – Based on 2000 U.S. Census Data of 2.5 persons per household times the number of residential properties within the District

** – Data obtained from Central Appraisal District – based on average value of buildings within the County multiplied by number of buildings

*** – Value based on insured value of District owned structures

To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there have been 98 tornados that have touched down within Jefferson County. These tornados caused an estimated $35.6M in damage. This data further indicates that between 1950 and 2002 there have been forty three damaging high wind events within the District that have caused an estimated $2.8M in damage. Dividing this prior loss by the span of years in which this loss was incurred, it is estimated that Jefferson County has a potential annual loss from high winds/tornadoes of $711,000.

The following approach was used to estimate the potential losses to new future buildings. As indicated in Table 4-3, total District building values are estimated at $5.5B. Using historical loss data, it is estimated that these $5.5 billion in buildings will experience annual losses in the amount of $711,000, which is .013% annual estimated damage. Given that there is no way to predict the geographic location of high winds/tornadoes, existing and new construction are at equal risk. Therefore, it is estimated

that there will be .013% of new building values damaged on an annual basis as a result of this hazard.

4.6.2 Hurricane

A hurricane is a tropical storm with winds that have reached a constant speed of 74 miles per hour or more. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane approaches, the skies will begin to darken and winds will grow in strength. As a hurricane nears land, it can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season that lasts from June 1 through November 30.

In the District, the risks associated with hurricanes are covered in sections 4.6.1 “high winds” and Section 5 “flood hazards”. Due to its distance from the Gulf Coast, storm surge is a risk for the District. To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there has been a hurricane that has caused damage within Jefferson County. In 1998 Hurricane Earl passed well to the east of southeast Texas, but high tide readings of 3.5 ft MSL caused minor flooding along the coast of Jefferson County, primarily in the Sabine Pass area causing an estimated $10,000 in flood damage. This damage occurred outside of the District’s boundaries. Due to the fact that there is no record of any historical building damage as a result of Hurricanes, the estimated annual dollar value damage to existing or future buildings due to hurricanes is zero. For these reasons, hurricanes have been eliminated from further evaluation and risk assessment.

4.6.3 Extreme Heat

Extreme heat kills by pushing the human body beyond its limits. Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms.

Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Other conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality.

In the District, summers are usually hot. The District has high humidity levels, which combine with the heat to produce a heat index of over 100 degrees for many days during the summer.

Within the District, Extreme Heat risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence across the entire County. As listed in Table 4-3, all people and assets are considered to have the same degree of exposure.

To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there were two extreme heat events that affected Jefferson County. Neither of these events caused any property damage or loss of life. Due to the fact that there is no record of any historical building damage as a result of extreme heat,

the estimated annual dollar value damage to existing or future buildings due to extreme heat is zero. For these reasons, extreme heat has been eliminated from further evaluation and risk assessment.

4.6.4 Drought

Drought is generally defined as a condition of climatic dryness severe enough to reduce soil moisture and water supplies below the requirements necessary to sustain normal plant, animal, and human life. In Texas, drought is often defined in terms of agricultural and hydrologic drought:

- Agricultural drought is considered a dry period of sufficient duration and intensity that crop and animal agriculture are markedly affected.
- Hydrologic drought is considered a long-term condition of abnormally dry weather that ultimately leads to the depletion of surface and ground water supplies. During hydrologic drought, a significant reduction in flow of rivers, streams, and springs is notable.

Texas is divided into ten climatic divisions that range from substantially heavy precipitation through semi-arid to arid climates. Most of Texas is prone to periodic droughts of differing degrees of severity. One reason is the state's proximity to the Great American Desert of the southwestern United States. In every decade of this century, Texas has fallen victim to one or more serious droughts. The severe-to-extreme drought that affected every region of the state in the early to mid-1950s was the most serious in recorded U.S. history.

In the District, the average duration of droughts is less than sixty days. Within the District, Extreme Heat risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence across the entire County. As listed in Table 4-3, all people and assets are considered to have the same degree of exposure.

To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there were five drought events that affected Jefferson County. None of these events caused any

property damage or loss of life. Due to the fact that there is no record of any historical building damage as a result of extreme heat, the estimated annual dollar value damage to existing or future buildings due to extreme heat is zero. For these reasons, droughts have been eliminated from further evaluation and risk assessment.

4.6.5 Wildland Fire

The U.S. Department of the Interior has developed the Wildland Fire Assessment System Web site to communicate information to the public via the Internet. Web visitors can view real-time maps showing potential for fire on any given day, including satellite-derived "greenness" maps.

Parts of Texas face major wildfire problems each year. The risk is increased and compounded by increasing development within the zone commonly referred to as the "urban-wildland interface." Within this zone of natural landscape, buildings become additional fuel for fires when fires do occur. Most wildland fires are man-caused and occur in the interface of developed lands and forest and range lands. In particular, the dry conditions, high temperatures, and low humidity that characterize drought periods set the stage for wildfires. In 1998, in what is considered the worst wildfire in state history, wildfires throughout the State burned a total of 422,939 acres and threatened 4,031 structures.

In the District, wildfires are most likely to occur during dry and hot periods in undeveloped and wooded areas. There are few developed wooded areas and limited urban/wildland interface therefore, the estimate of dollar value of properties at risk from wildfires is near zero.

To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there were no wildfire events that affected the County. Due to the fact that there is no record of any historical building damage as a result of wild fire, the estimated annual dollar value damage to existing or future buildings due to wild fire

s zero. For these reasons, wildfires have been eliminated from further evaluation and risk assessment.

4.6.6 Winter Storm

Winter storms in Texas, although not as numerous or severe as in the northern states, do occur often enough and with sufficient severity to be a threat to people and property. Generally, the winter storm season in Texas runs from late November to mid-March, although severe winter weather has occurred as early as October and as late as May in some areas. On average, central Texas is affected by one to two winter storms each year.

In the District, where the climate is subtropical, winter storms of such severity that property damage results are extremely rare. The Texas Department of Transportation has posted a number of bridges to warn drivers that icy conditions may occur.

Within the District, Winter Storm risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence across the entire District. As listed in Table 4-3, all people and assets are considered to have the same degree of exposure.

To estimate potential dollar value of losses to existing building, the District evaluated the prior loss data from the National Climatic Data Center, (http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes). This data indicated that between 1950 and 2004, there was one winter storm event (an Ice Storm in January of 1997) that affected the County as a whole. This event caused an estimated $18M in property damage (to buildings an personal property). In addition, there is one recorded extreme cold event (February 1996) that caused an estimated $50,000 in damage. Dividing this prior loss by the span of years in which this loss was incurred, it is estimated that Jefferson County has a potential annual loss from winter storms of $334,000.

The following approach was used to estimate the potential losses to new future buildings. As indicated in Table 4-3, total District building values are estimated at $5.5B. Using historical loss data, it is estimated that these $5.5B billion in buildings will experience annual losses in the amount of $334,000, which is .006% annual estimated damage. Given that there is no way to predict the geographic location of high winds/tornadoes, existing and new construction are at equal risk. Therefore, it is estimated that there will be .006% of new building values damaged on an annual basis as a result of this hazard.

4.6.7 Seismic/Earthquakes

An earthquake is a sudden motion or trembling caused by an abrupt release of accumulated strain on the tectonic plates that comprise the Earth's crust. Ground motion may be vertical or horizontal shaking. Figure 4-3 presents the general "earthquake risk" map prepared by the U.S. Geological Survey. It shows relative risk to compare seismic risks across the country. Most of Texas, including all of Jefferson County, is designated the lowest hazard rating.

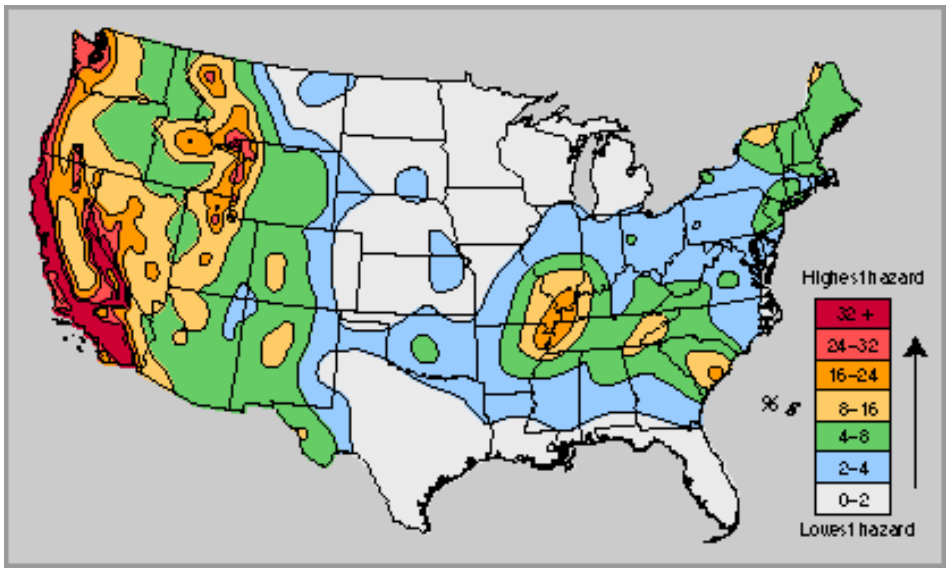


Figure 4-3. U.S. Seismic Hazards.

In the District, seismic risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform

probability of occurrence (extremely rare) across the entire District. As listed in Table 4-3, all people and assets are considered to have the same degree of exposure.

Due to the extremely low probability of an earthquake within the District and the fact that there is no record of any historical building damage as a result of seismic activity in the District, the estimated dollar value damage to existing or future buildings due to earthquakes is zero. For these reasons, earthquakes have been eliminated from further evaluation and risk assessment.

4.6.8 Landslides

The term landslide is used to describe the downward and outward movement of soils and rocks moving down a slope under the force of gravity. Landslides include mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and earth flows. Most landslides are associated with heavy, prolonged rains which saturate soils.

In 1997, the U.S. Geological Survey published a national map to illustrate landslide risk areas. The map combines past incidents with a measure of "susceptibility", defined as the "probable degree of response of rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation." The entire Texas coastal plain, including all of Jefferson County, is shown has having had less than 1.5% of its land area affected by movement of soils on slopes (no planning period is identified).

In the District, landslide risks to people and property cannot be distinguished by area; the hazard is reasonably predicted to have uniform probability of occurrence (extremely rare) across the entire District. As listed in Table 4-3, all people and assets are considered to have the same degree of exposure. Due to the extremely low probability of a landslide within the District and the fact that there is no record of any historical building damage as a result of landslides in the District, the estimated dollar value damage to existing or future buildings due to landslides is zero. For these reasons, landslides have been eliminated from further evaluation and risk assessment.

Part 5
Flood Hazards in the District

5.1 Flood Hazards: Overview

Floods have been and continue to be the most frequent, destructive, and costly natural hazard facing the State of Texas. Ninety percent of the State's damage reported for major disasters is associated with floods. Records indicate that the streams and bayous draining the District have flooded throughout the area's history. Most recently, since 1990 the District has been impacted by four significant flood events 1994, 1998, 2001, and 2002. These four events resulted in over $26 million in flood insurance payments.

Figures maintained by the National Climatic Data Center and the Centers for Disease Control indicate that Texas leads the country with more flood-related deaths than any other state (Table 4-1). Deaths due to floods, tropical storms and flash floods accounted for 38% of all weather-related deaths statewide, and 12.5% in the Jefferson County.

5.1.1 Defining Flood Hazards

When rainfall runoff collects in rivers, creeks, bayous, and streams and exceeds the capacity of channels, floodwaters overflow onto adjacent lands. Floods result from rain events, whether short and intense or long and gentle. In recent years, most flooding in the District has been associated with storms that originate as hurricanes and tropical storms that subsequently move inland. Flood hazards are categorized as follows:

- **Flash floods** not only occur suddenly, but also involve forceful flows that can destroy buildings and bridges, uproot trees, and scour out new channels. Most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or heavy rains from hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urban areas, where much of the ground is covered by impervious surfaces and drainageways are designed for smaller flows. Flood Insurance Rate Maps typically show the 1%-annual-chance (100-year) floodplain for waterways with at least 1 square mile of drainage area. The flood hazard areas for waterways with less than one square mile of drainage area typically are not shown.
- **Riverine floods** are a function of precipitation levels and water runoff volumes, and occur when water rises out of the banks of the waterway. Flooding along waterways that drain larger watersheds often can be predicted in advance, especially where it takes 24 hours or more for the flood crest (maximum depth of flooding) to pass. In Jefferson County,

riverine flooding is caused by large rainfall systems and thunderstorm activity associated with seasonal cold fronts. These systems can take as long as a day to pass, giving ample opportunity for large amounts of rain to fall over large areas. The Flood Insurance Rate Maps show the 1%-annual-chance floodplains.

- **Urban drainage flooding** occurs where development has altered hydrology through changes in the ground surface and modification of natural drainageways. Urbanization increases the magnitude and frequency of floods by increasing impervious surfaces, increasing the speed of drainage collection, reducing the carrying capacity of the land, and, occasionally, overwhelming sewer systems. Localized urban flooding is not usually shown on the Flood Insurance Rate Maps in areas with less than one square mile of contributing drainage area.

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA offer the best overview of flood risks. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings.

The revised Flood Insurance Study (FIS) for the City of Beaumont is dated August 6, 2002, and the revised Flood Insurance Study (FIS) for Jefferson County is dated September 2000. These FIS' compile all previous flood information and include data collected on numerous waterways. Both FIS' indicate that riverine flooding results primarily from overflow of the streams and drainage ditches caused by rainfall runoff, ponding, and sheet flow. Storms occurring during the summer months are often associated with tropical storms moving inland from the Gulf of Mexico. Thunderstorms are common throughout the spring, summer, and fall months. The frequent hurricanes and tropical storms interrupt the summer with high winds, heavy rainfalls, and high storm surges. FIRM maps for the City of Beaumont and Jefferson County show flood zones:

- **AE Zones** along rivers and streams for which detailed engineering methods were used to determine Base Flood Elevations (BFEs). AE Zones (or A1-30 Zones) are shaded in gray.
- **A Zones,** which are areas inundated by the 100-year flood for which BFEs and Flood Hazard Factors (FHFs) have not been determined
- **AH Zones**, which are areas inundated by types of 100-yea shallow flooding where depths are between one and three feet, and for which BFEs are shown, but no FHFs are determined.

- **B Zones and Shaded X Zones,** which are areas of "moderate" flood hazard, typically associated with the 500-year flood (or 0.2% annual chance).
- **C Zones and Unshaded X Zones** are areas of "minimal" flood hazard, typically considered to be "out of the floodplain." Although local drainage problems and ponding may still occur, these minor flood problems typically are not shown on the FIRM.

5.1.2 Subsidence-Related Flooding

Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to subsurface movement of earth materials. The principal causes of subsidence are aquifer-system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost. There is no evidence of land subsidence being a problem within the District.

5.1.3 Dams and Flooding

FEMA and the U.S. Army Corps of Engineers maintain the National Inventory of Dams (1998), a database of high and significant hazard dams. For the most part, data are provided by state agencies responsible for regulation and inspection of dams or by the Corps of Engineers. Based on that inventory, there are no high hazard dams that affect the watersheds in or draining through the District.

5.2 Flood Risks – Buildings

To develop more specific data about flood-prone buildings, the District worked with Jefferson County Engineering, Jefferson County Appraisal District and the City of Beaumont, who have assess to a tool called Geographic Information System (GIS). The tool that makes this possible is the GIS computer software application that relates physical features on the ground in mapping applications and analyses.

There are two ways to characterize buildings subject to flooding:

1. Using GIS and historical knowledge, it is estimated that 4,636 residential buildings and 383 non-residential are located in the flood-prone of the District. Therefore, not counting buildings that are susceptible but that are outside of the mapped floodplain,

approximately 10.5% of all buildings in the District are prone to some degree of flooding. JCAD data are used to develop average values for residential buildings ($71,629), and average values for non-residential buildings ($591,00) yielding estimates of the total value of flood prone buildings (Table 5-1).

Table 5-1. Flood Prone Properties.

	Residential	Non-Residential
Total number of buildings	43,896	3,629
Number of est. flood prone buildings*	4,636	383
(as % of total bldgs)	(10.5%)	(10.5%)

*Estimate of flood prone buildings is derived from actual historical building claims plus an estimate of number of buildings experiencing prior non-insured losses

2. Flood insurance policies and claims information can be used to identify buildings in mapped floodplains (where lenders require insurance) and where flooding has occurred (where owners are sufficiently concerned that they purchase flood insurance even if not required). This characterization of flood risk is described in the following text.

NFIP Policies In-Force. Data provided by FEMA indicate that as of December 31, 2002, federal flood insurance policies were in-force on over 6,800 buildings in the City of Beaumont and over 1,500 in unincorporated Jefferson County. These insurance policies are administered by the National Flood Insurance Program (NFIP). This represents a dollar value of property and contents coverage in excess of $1.5 billion.

For the most part, two factors prompt people to purchase flood insurance – when mortgage lenders require it and when actual flood damage makes it clear to homeowners that a building is, indeed, located in a flood-prone area. Thus, the number and distribution of flood insurance policies is one way to characterize potential risk throughout the District.

NFIP Claims Paid. Between 1978 and November 30, 2003, 3,602 flood insurance claims (building and contents combined) were paid on 2,318

buildings in Jefferson County and the City of Beaumont, many of which are not "in" the mapped floodplain . It appears that the vast majority of these claims were for residential properties. Total claims paid for building and contents payments exceed $38 million.

NFIP Repetitive Loss Properties. Figure 5-1 shows the locations of repetitive loss properties in Jefferson County and the City of Beaumont. In recent years, FEMA has focused considerable attention on this subset of insured buildings. These properties have received two or more claim payments of at least $1,000 over a ten-year period. For Jefferson County and the City of Beaumont, FEMA's database identifies 523 properties as repetitive loss properties. Collectively, they have received claim payments of over $24 million (includes payments for building damage and contents damage).

Because the data provided by FEMA do not detail the actual number and amount of past claims, no conclusions can be drawn regarding whether specific mitigation measures would be effective. For example, a property that has received a number of claim payments not much higher than $1,000 would be considered an unlikely candidate for mitigation using public funds. It may, however, be an excellent candidate for damage-reduction actions taken by the owner.

DD6 continues to evaluate both structural and non-structural solutions to the flood prone areas within the District – these areas include many properties on the NFIP repetitive loss property list.

5.3 Flood Risks – Public Buildings

The District owns just one complex of buildings on Walden Road. These buildings are not located in the Special Flood Hazard Area and have never experienced flooding.

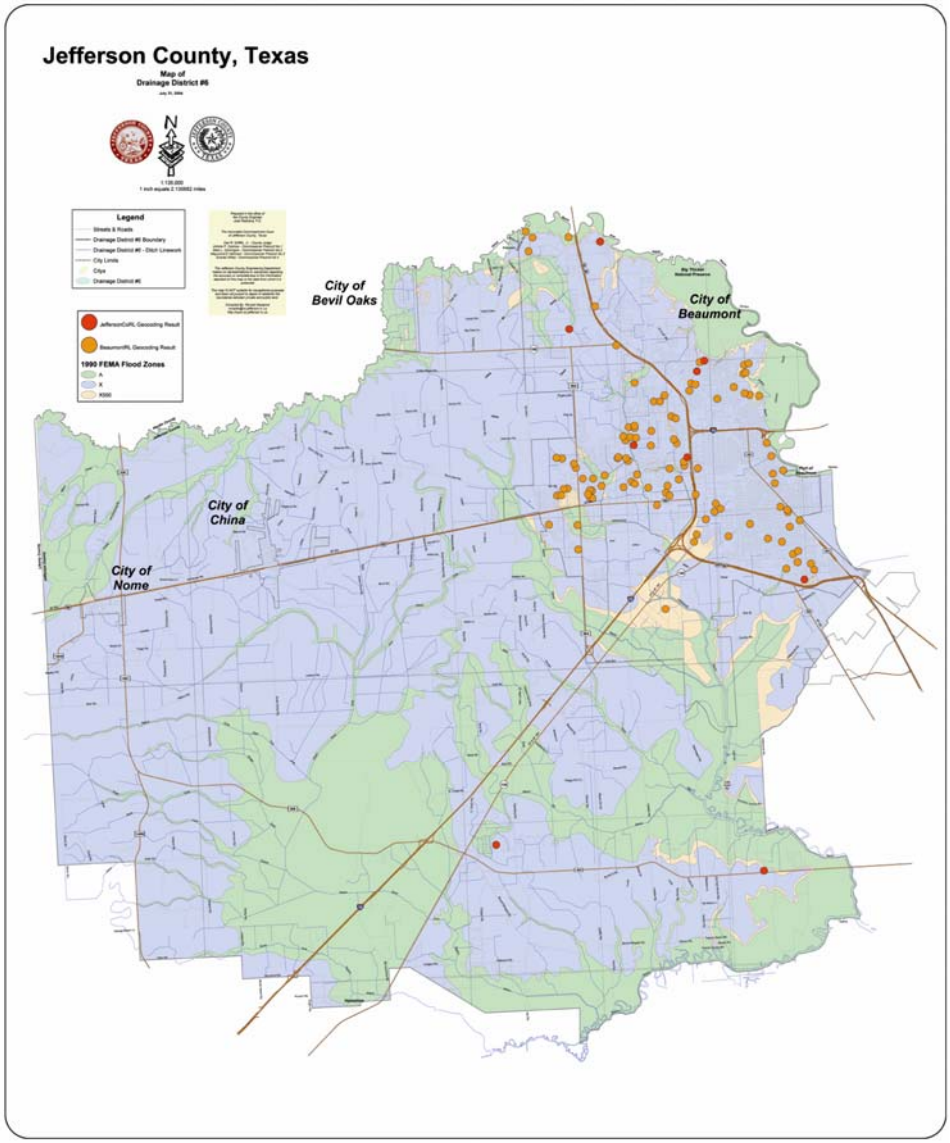


Figure 5-1. DD6 RL Properties with Floodplain Overlay.

Public Schools. The Beaumont Independent School District owns all of the areas 32 public schools. A review of the FIRM indicates none of these are in the mapped floodplain.

5.4 Flood Risks – Roads

Nationwide, flooded roads pose the greatest threat to people during floods. Most of the more than 200 people who die in floods each year are lost when they try to drive across flooded roads. Driving into water is the

number one weather-related cause of death in Central Texas. Statewide, between 1960 and 1996, 76% of flood-related deaths were vehicle-related (Texas Environmental Center, online).

As illustrated in Figure 5-2, flood hazards for cars vary with both velocity and depth of floodwaters. Many cars will float in less than 24 inches of water. Fast-moving water can quickly wash cars off the road or wash out a low section of road.

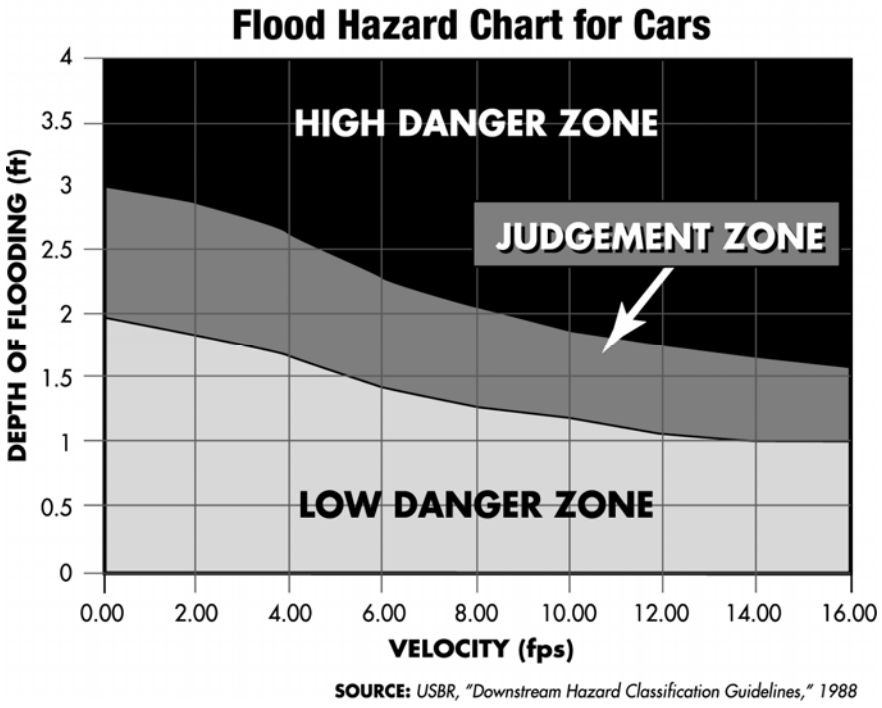


Figure 5-2. Flood Hazard Chart for Cars.

Although most roads in the area are unlikely to have deep or fast-moving water during flood conditions up to the level of the 100-year flood, many are still known to flood regularly. Within the City of Beaumont and Jefferson County there are approximately 1,165 miles of roads (750 miles within the City, and 415 within the County).

TXDOT maintains the freeways that run through the City to include

- Cardinal
- I-10
- East Tex
- Major
- College (90) – (from I-10 to the west)
- Fannett Rd (from Cardinal to the west)
- Martin Luther King (from I-10 to the south)

Due to the extensive road flooding in the District, it would be near impossible to generate a list of flood-prone roads. Members of the planning committee responded to the question of which roads in the area are flood-prone with the answer, "all of them". Due to this reason, the City and County do not close roads due to flooding. However, the City does close major underpasses where water tends to get much deeper. This is accomplished by waiting until the water is deep enough to warrant the closure. There are water depth signs at these major underpasses.

When building new state roads or upgrading existing roads, the Texas Department of Transportation considers the NFIP's floodplain and floodway requirements to evaluate the impact of new and replacement structures. The City and County consider floodplain and floodway impacts in its planning and design for area roads. Within the City of Beaumont, developers must satisfy the City's drainage criteria and other aspects of road designs in order for the City to accept ownership.

Replacing roads and bridges damaged or washed out by floods costs millions of dollars each year. If the damage is caused by a presidentially declared disaster, FEMA may pay up to 75% of the repair or replacement costs, with the remaining 25% covered by the state and local

governments. The full costs of a damaging event that is not declared a major disaster must be borne by the state and local communities.

TXDOT inspects state bridges for structural integrity and to determine if erosion is a risk. Where erosion has been identified, stabilization measures have been put into place.

Roads and drainage structures in the area have sustained limited erosion damage due to flooding. Damage has occurred to two bridges in area, the bridge on Phelan, and the Bridge on Longhorn Rd. Staff interviews resulted in the following characterizations of past road flooding:

- Most roads in the area are designed to carry water and, therefore, flood even in small events.
- The worst street flooding tends to be on feeder roads.

5.5 Flood Risks – Hazardous Materials

When floodwaters affect locations where hazardous materials are stored or used, the stage is set for potential effects that go far beyond the physical onsite damage. Certain materials are reactive in water and others may pose health and safety risks if distributed downstream by rising waters. Another potential hazard is the stores of chlorine used at water treatment plants, some of which are located adjacent to the mapped floodplain.

Despite the apparent risk, there have yet been no reported hazardous materials incidences related to flooding. Depending on the nature of the hazardous materials and the facilities containing them, it may be appropriate for facility owners to examine the potential for damage under reasonably anticipated flood conditions. In addition, owners may find it prudent to examine the sites to determine if it is appropriate and feasible to provide protection measures to minimize risks.

5.6 Flood Risks – Local Drainage

Many areas and streets experience accumulations of rainfall that are slow to drain away, which may cause disruption of normal traffic, soil erosion, and water quality problems. Local drainage problems contribute to the

frequency of flooding, increase ditch maintenance costs, and are perceived to adversely affect the quality of life in some neighborhoods.

Many areas prone to shallow, local drainage flooding are not shown on the City or County's Flood Insurance Rate Maps. One measure of the magnitude of this problem is the number of flood insurance policies in-force on buildings that are outside of the mapped floodplain. Local drainage flooding throughout the some subdivisions in the District is a problem, even during frequent rainstorms. It is a concern because access for emergency services (fire, emergency medical) can be limited. While the depth of water generally is relatively shallow, a number of homes have been flooded repetitively and are identified by FEMA as repetitive loss properties.

5.7 Summary: Exposure to Flood Risks

As described in Section 5.3, digital maps of the floodplain are used for flood hazard identification and assessments of risk. The data, combined with the footprint information for buildings, allow determination of residents and assets of the built environment that are at risk only by identifying whether such assets are in or out of the flood hazard area. No other characterization of flood risk can be made, i.e., depth of flooding or whether houses are in the floodway or the flood fringe.

Table 5-2, based on a form provided in the State's Mitigation Handbook (DEM 21) is a summary of flood risks. For the purpose of this table, number of people per home is based on the U.S. Census value of 2.5 occupants per household for the City of Beaumont and Jefferson County. Special facilities include fire stations and schools.

Table 5-2

DEM 21: Vulnerability and Risk Assessment Worksheet for Flood Hazard.

	Total
People (estimate)	11,590
Housing	4,636 ($332M)
Commercial Facilities	383 ($226M)
District-Owned Buildings	0
Critical Facilities	0
Special Facilities (schools; fire stations)	0
Infrastructure & Lifelines	87 ($14M)

5.7.1 Estimate of Annualized Damage from Floods

To estimate the potential total estimated annualized damages the follow approach was used. From actual historical paid losses combined with historical knowledge of the total of uninsured losses, it is estimated that buildings within the District have experienced $78M in flood losses. These losses occurred from April 1979 to current and have included 11 primary events (and several smaller, less costly events). Using this historical loss data to populate FEMA's Limited Data B/C software, the result is total estimated annualized damages of $3,267,087.

Part 6
District Processes

6.1 Jefferson County Drainage District No. Six' Structure

Jefferson County Drainage District No. Six (DD6) is a conservation and reclamation district and a political subdivision of the State of Texas. DD6 was established January 21, 1920, after favorable vote on January 10, 1920.

It was extended and enlarged (Vol. 63, P.478) according to the authority of the 57th Legislature, Chapter 349, and Chapter 7, Title 128, Revised Civil Statutes of Texas, Art. 8129. Enlargement came about in 1961 thru legislation (HB 1063), which also established the District as a Conservation and Reclamation District under Section 59, Article XVI, Texas Constitution. Containing approximately 450 square miles, DD6 lies wholly within Jefferson County and includes the City of Beaumont and was created primarily to provide drainage of overflow lands within DD6. DD6 is governed by a five member Board of Directors, appointed by the County Commissioners Court of Jefferson County, Texas (the Commissioners Court).

In addition to the Board of Directors, DD6 is organized into the following departments:

- **Administration** – personnel, finance, and general management of the District
- **Operations** – general maintenance of District equipment, facilities, and infrastructure, and construction of new infrastructure
- **Engineering** – flood studies of problem areas, identification and engineering of mitigation alternatives, and coordination with maintenance and new construction

There are many flood mitigation activities within the City of Beaumont and areas of Jefferson County that are the joint responsibility of the City and DD6 and the County and DD6.

6.2 Emergency Response

Emergency response is the responsibility of the City of Beaumont and Jefferson County. The City has some roadside ditches that they keep

clean but DD6 owns most ditches in the area and they keep those clean. After an event, it is a cooperative effort between City, County Precincts, and DD6 to identify ditches that need cleaning (as well as crossings). There are known problem areas that are regularly checked during and after an event.

Both the City and the County have early warning capability. Citizens in the area rely mostly on local weather, which is reported to be very capable. DD6 has over 50 stream gauges throughout the District (See Figure 6-1 for stream gauge locations as of July 2004). These stream gauges provide data that is used by DD6 and the Lake Charles branch of the National Weather Service to predict potential flooding. DD6 FTP's stream gauge data to the National Weather Service every 15 minutes. Figure 6-1 shows a graphical display of the District's network of stream gauges.

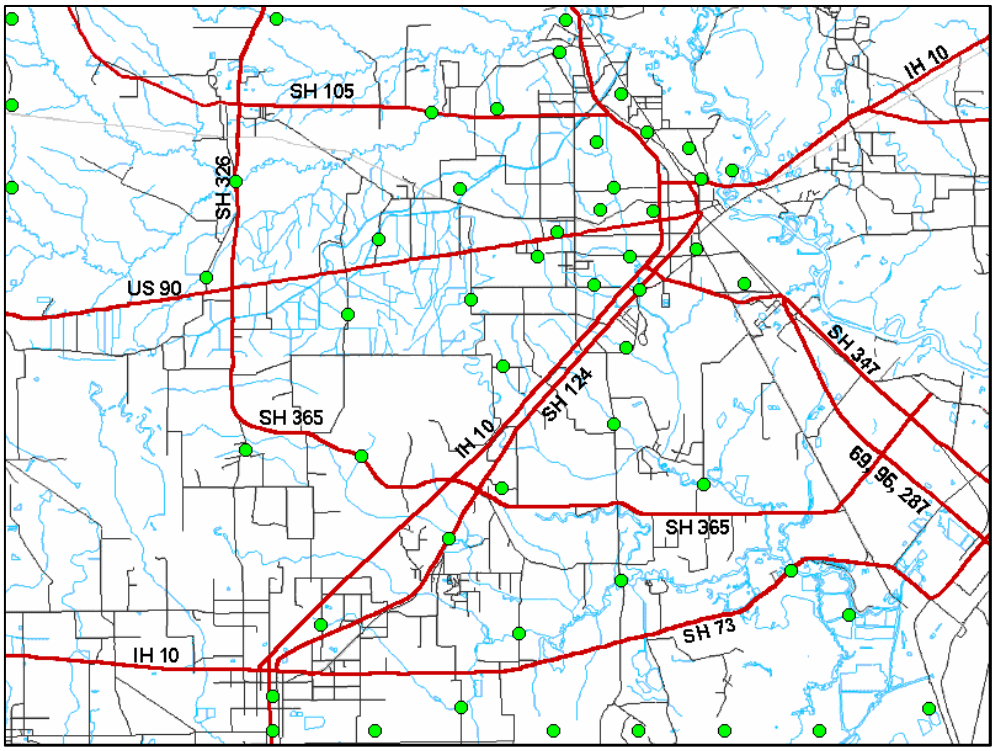


Figure 6-1. The District's Network of Stream Gauges.

The City and County use a system called Southeast Texas Alerting Network (STAN) for community and emergency notification. Recorded alert messages are placed on this system, the media is automatically notified, they inform the public as to the specifics of the alert and give the public the toll free STAN number to call and hear the original recorded message, if they so desire.

The City also uses a system called 1st call, which is an automated system that will call a preset phone tree to inform residents of impending danger from a hazard. The District assists both the City and County in emergency response and post-event cleanup as requested.

6.3 Communicating about Hazards

The District actively communicates with residents using a variety of media, each of which have been used to convey information, including content about hazards:

- DD6 and City of Beaumont have web sites that have hazard related data on them. In addition, DD6 has a site that list stream gauges and rainfall amounts throughout the District
- DD6, County, and City departments receive and respond to phone calls from public
- City of Beaumont has a Government Access Channel on local cable network
- Southeast Texas Alerting Network (STAN) is used to communicate to public before, during, and after an event. Emergency Management posts a recorded message on STAN that is distributed to local news (TV and radio) with a highlight of the message and a number to call for additional information
- Radio stations that carry STAN related broadcasts are KLVI and AM 530 – residents are used to tuning in to the radio to get hazard information
- Both the City of Beaumont and Jefferson County have FEMA publications about flood hazards and permit requirements at the permit counter
- There are seven TXDOT message boards on major highways that alert residents to local hazards
- DD6 attends community meetings upon request

Survey about Communication with Residents

Harris Davil & Associates recently completed a communication study that showed that 85% of the public expected to be notified of impending or ongoing hazards by TV and Radio

6.4 How the District Addresses Hazards

Members of the Mitigation Planning Committee were interviewed to gain an understanding of awareness of hazards and how they are addressed, and to gather information about damage associated with past hazard events. Minutes of committee meetings are in Appendix A. Pertinent Beaumont and Jefferson County ordinances and documents were reviewed to identify specific provisions pertinent to the District's hazards (report on file with the Administration Department).

6.4.1 Local Regulation of Development

The City of Beaumont and Jefferson County send permits for lots over one acre and all subdivisions to DD6 engineering for review and comment. The City of Beaumont and Jefferson County follow DD6' recommendations relative to required elevation – relative to BFE where available, or relative to adjacent grade where BFE is not available.

The City of Beaumont, Texas has land use, building code, and permit authority over the land within its corporate boundaries, including the authority to regulate development proposed within the special flood hazard areas designated on the City's Flood Insurance Rate Map.

Jefferson County, Texas has land use and permit authority over the land within its boundaries, including the authority to regulate development proposed within the special flood hazard areas designated on the County's Flood Insurance Rate Map.

The communities serviced by DD6 have experienced minimal growth in recent years. In the most recent 2-year period, the City Beaumont has issued an average of 262 single-family permits per year and Jefferson County has issued an average of 207 single-family permits per year (Table 6-1).

Table 6-1

Buildings Permits and Development Permits (2002, 2003).

Jefferson County

Permit Type	2002	2003
New Home Construction	138	122
Mobile Home	85	70
Businesses	26	22
Not new home moved onto property	12	7
Storage	24	27
Barn	14	17
Improvement > 50% of home value (Remodeling, Mold, Flood)	6	12
Other	0	2
Total	305	279

City of Beaumont

Permit Type	2002	2003
New Residential Construction	260	264
In SFHA	6	5
Out of SFHA	254	259
Residential Accessory	81	107
In SFHA	0	0
Out of SFHA	81	107
New Commercial Construction	110	62
In SFHA	1	2
Out of SFHA	109	60
Commercial Accessory	24	18
In SFHA	0	0
Out of SFHA	24	18

Inspections. The City of Beaumont has six building inspectors who conduct inspections of all permitted development. A series of inspections is conducted on every building, ranging from foundation and framing, to electrical, plumbing, and fire code inspections. Jefferson County has no inspectors, as there is no budget within the County to support an inspection department. For development in the floodplain, the County relies on the certified information provided by an engineer on the elevation certificate. Elevation Certificates are collected before the CO is issued for buildings in the SFHA.

The District is not involved in the inspection process within either the City of Beaumont or Jefferson County.

6.4.2 Hazards Other than Flood

As part of its rules for regulating growth, incorporated areas within in the District and Jefferson County recognize the importance of certain measures to limit damage and exposure of citizens to hazards other than flooding.

High Wind Hazards. Jefferson County is located in the area of the State in which the Texas Windstorm Insurance Association functions as the insurer of last resort for wind and hail coverage when other insurers exclude coverage for those perils from homeowners and other property policies. In order for new construction or modifications to existing structures to qualify, inspections must be performed by inspectors from the Texas Department of Insurance or licensed professional engineers who are appointed by the Department. Several inspections may be performed to determine compliance with the wind provisions of the buildings code, and a certificate of compliance is issued.

6.4.3 Flood Hazards

City of Beaumont and Jefferson County administer a suite of regulations and ordinances that combine to comprehensively regulate flood hazard areas to minimize exposure of people and property. Within the City of Beaumont, administration of these provisions is the joint responsibility of the City's Floodplain Manager and the Building Code Official. Within Jefferson County, these ordinances are administered within the

engineering department. As indicated previously, development permits are provided to DD6 engineering department for review and comment.

Processing Floodplain Development Proposals. Most homes built in the floodplain are slab-on-grade, elevated by the placement of a minimum quantity of fill. Elevation Certificates are required for all construction in the floodplain. City of Beaumont regulations require that the lowest floor, including basement, be at least 18" above the Base Flood Elevation. Within unincorporated Jefferson County, regulations require the lowest floor, including basement, be at least one foot above the Base Flood Elevation.

Reviewing and Approving Subdivisions. Both the City of Beaumont and Jefferson County, submit all subdivisions proposals to DD6 engineering for review and comment. DD6 evaluates both current floodplain/BFE requirements and known historical flooding when providing their recommendations.

Within the City of Beaumont, Sec. 24-8. "Preliminary plat" of the FLOOD DAMAGE PREVENTION (Ordinance No. 02-050; Article III, July, 2002), has the following relevant sections:

- (a)(10): refers to submission of design computations
- (a)(11): topography is not generally required.
- (b): Establishes timeline for action by the Planning Commission, which must act "upon an application completed in accordance with the requirements of this ordinance" within 30 days. The Commission's approval constitutes conditional approval of the final plat, subject to the approval by the City Engineer. [City does not formally notify the applicant when the application is complete, but "starts the clock" when the plat is received.]
- (d)(1): before construction begins, final construction plans must be submitted, including features related to drainage, which are subject to acceptance by the City Engineer. Reference is made to the "official standard requirements of the City" which are conveyed as comments.
- Sec. 24-9. "Final plat." of the FLOOD DAMAGE PREVENTION (Ordinance No. 02-050; Article III, July, 2002), has the following relevant sections:

- Requires the “final plat must comply in all respects with the approved preliminary plat” drainage should be shown.
- (a)(8): Permanent survey reference monuments are to be shown.
- (a)(13): Final plat must show flood zones, boundaries and elevations.

Within Jefferson County, subdivisions are regulated via "RULES, REGULATIONS AND REQUIREMENTS RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS OR RE-SUBDIVISIONS. Revised March 28, 1994”. Some relevant references from this ordinance include:

- **Article 1(b):** Approval and acceptance of streets, roads, storm sewers, drainage ditches and drainage easements, fresh water supply and sanitary sewage disposal and setback lines of a subdivision or re-subdivision is contingent upon compliance.
- **Article 1(b):** Compliance is required in the extraterritorial jurisdiction of any incorporated city, town or village; in the case of conflict, the regulations of the city, town or village shall prevail. The width of the ETJ varies as a function of the population of the municipality.
- **Article 1(k):** Developer required to submit elevations of each lot.
- **Article 1(n):** Developer required to obtain approval of drainage plan from applicable Drainage District and shall submit approval with plat, said plan must comply with the Jefferson County Floodplain Order.
- **Article 1(q):** Requires compliance with State requirements for on-site sewage facilities; planning materials that must be submitted include the “100-year floodplain map.” As part of this requirement, states that “A comprehensive drainage and 100-year floodplain impact plan must also be included in this planning material.

6.5 Continued Compliance with the NFIP

Participation in the National Flood Insurance Program is important to the City of Beaumont, Jefferson County and their residents. This is evidenced by DD6, the City, and the County’s commitment to regulating development and redevelopment, by adoption of provisions that exceed the minimum requirements, and by its active pursuit of mitigation opportunities. The City and County, with support from DD6, are firmly committed to continued compliance with the NFIP.

The City of Beaumont satisfied requirements for initial participation in the NFIP and joined the Emergency Program. Upon issuance and final approval of the Flood Insurance Rate Map, in October of 1970the City joined the Regular Program. The effective Flood Insurance Rate Map for Beaumont has been revised a number of times to reflect more detailed information and changes to the floodplain, and is now used as the minimum flood hazard area within which development must conform to floodplain management regulations.

Jefferson County satisfied requirements for initial participation in the NFIP and joined the Emergency Program. Upon issuance and final approval of the Flood Insurance Rate Map in June of 1983, the County joined the Regular Program. The effective Flood Insurance Rate Map for the County has been revised a number of times to reflect more detailed information and changes to the floodplain, and is now used as the minimum flood hazard area within which development must conform to floodplain management regulations.

Regulations Review. A review of the City of Beaumont's and Jefferson County's floodplain regulations and subdivision standards was prepared and City and County staff were interviewed. The review, on file with the District, the City and the County, was performed to ensure continued compliance with the NFIP and to identify opportunities to clarify regulatory language. The regulations are consistent with the NFIP. The findings suggest the following:

Jefferson County and City of Beaumont Ordinance Reviews

Jefferson County

A review of the County's Flood Damage Prevention Order (August 5, 2002) and Rules, Regulations and Requirements Relating to the Approval and Acceptance of Improvements in Subdivisions and Re-Subdivisions (revised March 28, 1994) was prepared and County staff were interviewed. Please note: separate action was used to adopt the County's 12" freeboard requirement. The review, on file with the District, was performed to ensure continued compliance with the NFIP and to identify

opportunities to clarify regulatory language. The regulations are consistent with the NFIP. The findings suggest the following:

- Minor revisions could add missing definitions, remove unused definitions, and improve consistency with the NFIP regulations in a small number of instances.
- Minor revisions to provisions dealing with substantial improvement will improve consistency.
- Provisions related to enclosures under elevated buildings in areas other than V Zones should be added, in the event extended foundation walls (crawlspace) are used to achieve elevation.
- Enclosures below the elevated floor currently are not allowed to be habitable floors. The definition of habitable floor is not consistent with the NFIP's use restrictions for enclosures (which may be used only for parking, building access and limited storage).

City of Beaumont

A review of the City's Flood Damage Prevention Ordinance (No. 02-050 and Subdivision Ordinance (No. 83-95, as amended) was prepared and City staff were interviewed. The review, on file with the District, was performed to ensure continued compliance with the NFIP and to identify opportunities to clarify regulatory language. The regulations are consistent with the NFIP. The findings suggest the following:

- Minor revisions could remove unused definitions and improve consistency with the NFIP regulations in a small number of instances.
- Clearer links could be made between the Flood Damage Prevention Ordinance and the Subdivision Ordinance to assure that owners and builders working in approved subdivisions are made aware of the floodplain requirements.
- Modifications may be considered to ensure adequate review of drainage for subdivisions that currently are exempt from the preliminary plat provisions.

Community Assistance Visit (CAV). Both the City of Beaumont and Jefferson County have recently had CAVs. The City's CAV, conducted in 2003 found the City to be in continued compliance with the NFIP. The County's CAV, conducted in 2002, also found the County to be in continued compliance with the NFIP.

The Community Rating System. The review of the floodplain regulations also served to identify measures adopted by the City of Beaumont and Jefferson County that may qualify for credit under the NFIP's Community Rating System (CRS). The CRS is intended to recognize and encourage management of flood hazard areas above the minimum requirements of the NFIP. The CRS offers discounts on the cost of federal flood insurance to those citizens who reside within recognized communities.

Nationwide, the average NFIP premium for $100,000 in coverage property in A Zones and AE Zones is on the order of $500. Thus, in communities with a 5% CRS discount, policyholders see, on average, annual savings of $25. The cost of the average B, C, and X Zone policy is $150; thus policyholder savings in these zones outside of the 100-year floodplain would be only $7.50 per year. Regardless of the CRS discount available in A and AE Zones, which goes up in 5-percent increments, the discount on B, C, and X Zones is capped at 5%.

For the City of Beaumont's and Jefferson County residents, cost savings due to the CRS discount can be estimated. It is important to note that the total number of flood insurance policies exceeds the number of buildings within the mapped flood hazard area. Therefore, for the purpose of this estimate, a CRS discount of only 5% is assumed to apply to all policies. As of December 2002, the NFIP reports that 68,386 flood insurance policies are in force (6,873 in the City of Beaumont and 1,513 in Jefferson County and policyholders pay almost $3 million per year in premiums. Therefore, a 5% discount would yield a total savings for property owners of about $150,000 each year.

6.6 Ongoing and Previous Mitigation Initiatives

Dealing with flood hazards, the most significant natural hazard in the Jefferson County area, is not a new proposition. Indeed, the District is spending considerable funds for projects and studies to reduce and/or eliminate the severity of flooding in the area. Those specific studies and projects are described in the following subsections.

Drainage districts within the State of Texas have recently been granted additional authority via Chapter 49.211 of the Texas Water Code and House Bill 919. Specifically Chapter 49.211 of the Texas Water Code requires districts to adopt master plans before they can adopt rules relating to review and approval of proposed development drainage plans. Further, HB 919 gives districts the authority to require developers to submit drainage plans for approval during the platting process. DD6 is in the process of drafting a Master Drainage Plan.

6.6.1 Gulf Terrace Detention Basins Project

In 2003, Jefferson County Drainage District No. Six (DD6) received a Flood Mitigation Assistance (FMA) grant for the construction of Detention Basins. Approximately 1600 existing homes in several subdivisions to the south of the Basins are in danger of flooding and 150 homes currently experience periodic flooding. Thirty homes in this area are on FEMA's repetitive loss list. The purpose of the project is to provide flood relief for those homes in Upper Janes Gully watershed by eliminating most of the flood Zone X (500yr) and Zone AE (100yr) to the southeast of the project area. With the accomplishment of these improvements the vast majority of the shallow home flooding that has been occurring in this area will be eliminated and the outfall capacity will be provided for other smaller collector systems.

6.6.2 TWDB Engineering Study Grant of Hillebrandt Bayou Watershed

Jefferson County Drainage District No. Six (DD6) received an Engineering Study Grant from TWDB to conduct a thorough study of the Hillebrandt Bayou watershed and to develop a Master Drainage Plan. In addition to the development of the Master Drainage Plan, the District will study an unstudied portion of the watershed that has experienced significant prior flooding. This study area is DD6's top priority due to the extent of prior flooding and the limited solutions based on currently available engineering data. Additional data that will be gathered via this study is required to determine best/most cost effective alternatives to prevent future flooding.

There have been studies completed on other parts of this watershed. With the completion of this study, all areas of the watershed will have been studied. The goal, once this study is complete, is to compile all study data into one complete watershed study. Data from these studies will be utilized to ensure that any proposed mitigation alternatives will not negatively impact any up or downstream areas of this watershed or adjacent watersheds.

6.6.3 Floodplain Acquisitions

Prompted by significant flooding in 2002, which resulted in Presidential Declaration DR1439, the County and DD6 collectively initiated acquisition of one flood-damaged home. A Hazard Mitigation Grant Program (HMGP) grant of $73,575 was awarded through the Texas Division of Emergency Management for the acquisition and removal of one substantially damaged properties. The District provided the 25% non-federal match.

6.6.4 Other Federal Funding

The District has not previously received any federal funding from Project Impact (PI), the Pre-Disaster Mitigation (PDM) program, or annual Property Protection-Mitigation (PP-M) program.

6.6.5 Public-Private Partnerships

The District has not formed any public-private partnerships that are related to natural hazards and hazard mitigation

6.7 Natural Resources

Both the City of Beaumont and Jefferson County require applicants that propose to impact wetlands to obtain approvals from the U.S. Army Corps of Engineers. In addition, the District obtains Corps permits for construction activities that impact wetlands.

Part 7
Mitigation Actions

7.1 Identifying Priority Actions

Throughout the planning process, the Mitigation Planning Committee discussed hazards, the number of people and types of property that are exposed, and the development review process. Based on a review of the background materials and the Committee's understanding, 17 potential actions were identified, circulated, reviewed, and prioritized. Of these 17 draft mitigation action items, a couple were combined and/or slightly modified.

Factors that influenced prioritizing included the Committee's review of available information on flood hazards, other hazards, past hazard events, the number of people and types of property exposed to those hazards, and the elements of the development approval process. High priority was placed on those actions that are considered consistent with current District policies, those that are technically feasible and have high political and social acceptance, and those that can be achieved using existing authorities, budget levels, and staff.

Composites were made of the priorities indicated by each Committee member in the context of his or her agency's responsibilities. This analysis initially yielded eight high-priority actions and five medium-priority actions; subsequent discussions resulted in further refinement of the list.

7.2 Mitigation Actions

Table 7-1 identifies each high priority mitigation action and identifies the proposed lead office and support assignments, priority level, and timeframe. The proposed timeframes are consistent with the five-year review cycle required for this Plan. For each high priority action, the Committee identified the lead department or office, characterized anticipated support by the DD6 Board of Directors, DD6 Management, and the community at-large, discussed funding limitations and status, and developed a qualitative statement regarding cost effectiveness. In this context, the cost of accomplishing the action was compared to the perceived benefits, including community-wide safety.

Medium priority actions and low priority actions (Table 7-2) are scheduled for further consideration when the District undertakes the comprehensive review. Lead departments or offices and other factors will be discussed and documented during the Plan revision. At that time, it is expected that new actions will be identified and a process to prioritize all remaining actions will be undertaken.

The following mitigation actions were discussed, but were dropped from further consideration because it was felt that these actions were outside the authority of the Drainage District.

- Sponsor building code training for local engineers, architects, contractors, home improvement contractors (with emphasis on wind and flood provisions)
- Sponsor flood-proofing workshops for non-residential property owners (if any are identified as in the SFHA)
- Facilitate local public school development and delivery of classes on hazards and mitigation measures - school science and social studies curricula.

An updated version of this table will be included in periodic progress reports submitted to the Texas Division of Emergency Management, the Texas Water Development Board, and FEMA.

Note: Mitigation action items pertain to both current and future development as well as infrastructure, as applicable, within the District. Action Item #5 pertains exclusively to future development.

Table 7-1

High Priority Mitigation Actions.

Mitigation Actions & Notes on Implementation	
HIGH PRIORITY: Time Period (2005 – 2010)	
Action # 1: Continue to pursue cost effective mitigation projects; apply for federal funding, as appropriate. For flood mitigation projects, focus on areas known to be flood-prone/Repetitive Loss areas. For other hazards mitigation projects, coordinate with Jefferson County and incorporated areas within the District as they will be required to take the lead on non-flood related projects.	
Lead Office	DD6 Administration

Table 7-1

High Priority Mitigation Actions.

Mitigation Actions & Notes on Implementation	
Support	Strong
Status & Funding Notes	Some projects currently funded as part of operating budget. (See DD6 Current Capital Projects list of currently funded mitigation projects). Others contingent upon federal grant funds - cost-share will be required in future budgets if federal grant funds are obtained for projects.
Cost Effectiveness	Very cost effective
Action # 2: Complete a thorough engineering study of the entire Hillebrandt Bayou watershed - focused on identifying cost effective alternatives to prevent future flood damage.	
Lead Office	DD6 Engineering
Support	Strong
Status & Funding Notes	50% of the cost of this study has been funded by the Texas Water Development Board. The study is ongoing.
Cost Effectiveness	Very cost effective
Action # 3: Implement a flood mitigation project to build two detention basins and a collector channel, as well as increase the capacity of existing detention basin A, on the upper end of Caldwood Cutoff. Additionally, complete channel work on the lower end of the watershed, and raise a private vehicle bridge on the lower end of the watershed.	
Lead Office	DD6 Administration
Support	Strong
Status & Funding Notes	An application for 75% of the funding for this project was submitted to TWDB as part of the FMA04 project grant process. Word from FEMA Region VI is that this project will be funded. The remaining 25% will come from DD6's operating budget.
Cost Effectiveness	Using FEMA's B/C software, the benefit cost ratio on this project is above 3.0.
Action # 4: Formalize procedures on DD6 roles and responsibilities before, during, and after a hazard event	
Lead Office	DD6 Administration
Support	Strong
Status & Funding Notes	Limited funds required. Can be funded out of operating budget
Cost Effectiveness	Very cost effective.
Action # 5. Develop and adopt a master drainage plan in order for DD6 to exercise the authority granted to drainage districts under Chapter 49.211 of the Texas Water Code. Chapter 49.211 requires districts to adopt master drainage plans before adopting rules relating to the review and approval of proposed development drainage plans	
Lead Office	Engineering
Support	Strong (coordination with City of Beaumont, Jefferson County and local developers).
Status & Funding Notes	Project has recently begun. 50/50 grant for development received from TWDB.

Table 7-1

High Priority Mitigation Actions.

Mitigation Actions & Notes on Implementation	
Cost Effectiveness	Cost effective.
Action # 6. Work with National Weather Service to augment and perfect Pine Island Bayou Modeling.	
Lead Office	DD6 Engineering
Support	Strong
Status & Funding Notes	Costs to implement to be determined. If significant, would need to be budgeted in out years.
Cost Effectiveness	Likely to be very cost effective – To be determined
Action # 7: Periodic informational mailings to at-risk property owners (flood insurance, importance of maintaining drainage, flood safety, easy mitigation measures, permit requirements). Include information on other relevant hazards, as appropriate.	
Lead Office	Engineering/Administration
Support	Strong – cooperation with City of Beaumont and Jefferson County
Status & Funding Notes	Communication flyers currently under development. Funded as part of the mitigation plan development.
Cost Effectiveness	Cost effective.
Action # 8: Enhance DD6's internal GIS capabilities	
Lead Office	Engineering
Support	Moderate
Status & Funding Notes	District is in discussions with potential GIS software and training providers May require additional funding in future budgets.
Cost Effectiveness	Cost effective

Table 7-2

Medium/Low Priority Mitigation Actions.

Mitigation/Low Actions & Notes on Implementation MEDUIM PRIORITY: Time Period (2010+)
Medium Action #9: One member of DD6 engineering staff required to be a Texas CFM
Medium Action #10: Conduct homeowner workshops on retrofitting & low cost measures
Medium Action #11: Increase coordination with the City and County regarding flood predictions and post event recovery
Medium Action #12: Encourage the City of Beaumont and Jefferson County to enter the CRS program. Assist in the application development, as appropriate
Medium Action #13: Increase flood predictive capability for streams and creeks that affect the District (stream gages).

Table 7-2

Medium/Low Priority Mitigation Actions.

Mitigation/Low Actions & Notes on Implementation MEDUIM PRIORITY: Time Period (2010+)
Low Action #14: Collect "sunny day" data for at-risk buildings (photographs, elevation information/certificates)
Low Action #15: Identify whether hazardous materials handlers/waste sites are in the mapped floodplain; if flood-prone, notify company and encourage protective measures.

Table 7-3 provides an overview of natural hazards within the District and the link to the action item(s) related to these hazards. It should be noted that Jefferson County Drainage District No. Six (DD6) was created primarily to provide drainage of overflow lands within DD6. As such, the District has no authority to address hazards other than flood. Jefferson County and incorporated jurisdictions within the District are currently developing their own All-hazards mitigation plans. These plans include action items relating to all hazards, include floods. DD6 cooperates with these jurisdictions on the identification and implementation of mitigation projects, as allowed by law. This coordination is focused on mitigation projects designed to prevent future flood damage. Both Jefferson County and the City of Beaumont participated in this planning effort.

For hazards where the probability of occurrence, and the estimated annual dollar value of damage were both determined to be low, action items were not identified.

Table 7-3

Linking Actions to Hazards.

Hazard	Probability of Occurrence*	Estimated Annual $ Damage**	Action Item(s)
Floods	High	High	1 - 15
Winter Storm Hazards	Low	Medium	1, 4, 7
High Wind Hazards/Tornadoes	High	Medium	1, 4, 7

* Based on Historical Occurrences as indicated in sections 4 and 5

** Based on calculated estimate of annual damage

Less than $250,000 annual estimate of damage = Low

Between $150,000 and $1,000,000 annual estimate of damage = Medium

Greater than $1,000,000 annual estimate of damage = High

7.3 Links to Mitigation Goal Statement

DD6's Mitigation Goal Statement
The mitigation goals of the District are:

- To protect public health, safety, and welfare;
- To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
- To facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems; and
- To seek solutions to existing problems.

Table 7-4 shows how the proposed actions listed in Section 7.1 directly support the District's Mitigation Goal Statement. A number of actions individually support more than one element of the goal.

Table 7-4

Linking Mitigation Goals & Actions.

Element of Goal Statement	Actions Relating to Goal
Protect public health, safety, and welfare;	1, 2, 3, 4, 6, 7, 10, 11, 12, 13, 14, 15
Reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
Facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems	2, 5
Seek solutions to existing problems	2, 3, 5, 7, 10, 11

Part 8. Texas Agencies, Organizations & FEMA Programs

8.1 Overview

Mitigation of flood hazards traces its roots to Congressional deliberations about how to address continued and repetitive flood disasters throughout the first half of the 20th Century. The National Flood Insurance Program, authorized in 1968, prompted state and local government actions primarily intended to recognize and account for flood hazards in decisions on local development. It was not until 1988 that the concept of mitigation planning was articulated in a statute, known as "Section 409" planning. In 2000, the statute was revised under the Disaster Mitigation Act of 2000.

At the federal level, the Federal Emergency Management Agency administers mitigation programs that foster planning and project implementation to address existing risks. At the state and regional levels, several agencies and organizations sponsor programs that bear on hazard mitigation. The following sections provide an overview of existing Texas agencies, organizations, and programs addressing hazard mitigation.

8.2 Texas Division of Emergency Management

The Texas Governor's Division of Emergency Management (GDEM) (www.txdps.state.tx.us/dem) is designated by the Governor as the state's coordinating agency for disaster preparedness, emergency response, and disaster recovery assistance. GDEM is also tasked with coordinating the state's natural disaster mitigation initiatives, chairing the State Hazard Mitigation Team, and maintaining the State of Texas Emergency Management Plan. GDEM fosters local mitigation planning and administers Hazard Mitigation Grant Program funds provided through the Federal Emergency Management Agency.

8.3 Texas Water Development Board

The Texas Water Development Board (TWDB; www.twdb.state.tx.us) administers a variety of programs related to water. The TWDB is the agency charged with statewide water planning and administration of financial assistance programs for the planning, design, and construction of water supply, wastewater treatment, flood control, and agricultural

water conservation projects. TWDB administers funding from FEMA under the Flood Mitigation Assistance Program (see Section 8.8).

8.4 Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ; www.tceq.state.tx.us) is a diversified agency dealing with permitting, licensing, compliance, enforcement, pollution prevention, and educational programs related to preservation and protection of air and water quality and the safe disposal of waste. Related to mitigation of natural hazards are TCEQ programs that deal with drought, dam safety, and flood control and floodplain management.

TCEQ is designated by the Governor as the State Coordinating Agency for the National Flood Insurance Program. In this capacity, the agency assists communities with floodplain mapping matters and interpretation and enforcement of local floodplain management regulations.

8.5 FEMA National Flood Insurance Program

In 1968, Congress authorized FEMA's National Flood Insurance Program (NFIP) for two primary purposes: (1) to have flood-prone property owners contribute to their own recovery from flood damage through an insurance program; and (2) to guide development such that it is less prone to flood damage. To facilitate implementation, the NFIP created Flood Insurance Rate Maps (FIRMs) that, based on best available information and engineering methodologies, show areas subject to flooding by the 1-percent-annual chance flood (also called the "100-year flood"). Communities use the maps to guide and regulate development. Citizens and insurance professionals use the maps to determine insurance needs.

It is notable that, whereas flood insurance claims are paid when damage is sustained from any qualifying flood event, federal disaster assistance is available only after a flood is determined to be a "major disaster." A major disaster exceeds state and local capabilities. In addition, disaster grants to individuals and families are limited to approximately $14,000 (average payment is $6,000). Therefore, owners of insured buildings that

are in areas known to flood, especially as shown on FIRMs, are protected financially as long as they carry sufficient flood insurance coverage. Additional information on flood insurance coverage for property owners and consumers is available online at www.fema.gov/nfip.

Basic federal flood insurance helps pay for property damage and loss of contents. Under certain circumstances – for example, if flood damage causes "substantial damage" – an additional mitigation claim payment is available to help owners bring buildings into compliance with NFIP flood protection standards (as of May, 2003, this additional payment is capped at $30,000). In addition, compliance is required when a building is substantially improved (includes repair of substantial damage). Substantial improvement is defined as improvements valued at 50% or more of the building's market value before improvement.

Flood Insurance in Texas (as of 9/30//2003)

- With 461,201 NFIP policies in force (10% of all policies nationwide), Texas ranks second among all states in number of flood-insured properties (Florida is #1).
- Property owners in Texas have received over 132,000 claim payments totaling $2.61 billion; only Louisiana has had more claims paid.

Source: NFIP Statistics online at www.fema.gov/nfip

8.6 FEMA Mitigation Grant Programs

In 1988, Congress authorized the first grant program intended to help local jurisdictions and states mitigate the effects of natural hazards. From time to time, additional funds have been authorized by Congress, although generally they are intended to achieve similar purposes and are administered in the same manner.

Pre-Disaster Mitigation Program (PDM)

Authorized by the Disaster Mitigation Act of 2000, Pre-Disaster Mitigation grant program funds are expected to be appropriated each year

to support a grant program that is funded regardless of disaster experience. As of mid-2003, the regulations for the program were not promulgated, although they are expected to be similar in most respects to the Hazard Mitigation Grant Program (below). The most significant difference will be that the funds made available will not be allocated by the state immediately after a disaster, but awarded on a nationwide, competitive basis.

Hazard Mitigation Grant Program (HMGP)

First authorized in 1988, the Hazard Mitigation Grant Program (HMGP) funds become available after major disasters. The amount of funding is determined as a percentage of certain types of federal assistance (e.g., emergency support, assistance to repair public infrastructures, and assistance to individuals and families). HMGP provides up to 75% of eligible costs, the remaining 25% must come from other, approved sources that may include, including in-kind and property owner contributions. Eligible grantees include local jurisdictions and certain private non-profit organizations.

Eligible projects must solve a given hazard problem, be cost effective, conform with environmental regulations, meet all applicable codes and standards, and be supported by state and local mitigation plans. For the most part, HMGP funds have been used by local jurisdictions to address flood hazards, primarily through acquisition of flood-prone houses and land. Other eligible projects have included elevation-in-place of flood-prone houses, floodproofing of public infrastructure, floodproofing of non-residential buildings, and drainage improvements.

Flood Mitigation Assistance Program (FMA)

Specifically authorized by Congress in 1994 to fund projects that are "in the best interests of the NFIP," the Flood Mitigation Assistance Program (FMA) is funded each year by Congress, regardless of disaster declarations. Funds are available to support planning, technical assistance, and projects. In recent years, considerable focus has been on projects that address properties known as repetitive loss properties. These are properties that have received two or more flood insurance claim payments above a certain value. States receive an annual share of funds

from FMA that can be used for acquisition/demolition of flood-prone buildings; elevation-in-place, relocation, or floodproofing of structures (including public structures); and minor flood control projects that do not duplicate activities of other federal agencies.

Part 9
Implementation

9.1 Distribution

The Jefferson County Drainage District No. Six (DD6) Hazard Mitigation Plan will be posted on the Distirct's Web site and notices of its availability will be distributed to the following:

- The federal and state agencies that were notified and invited to participate in Plan development (see Sec. 1.3);
- Jefferson County, City of Beaumont, City of Bevil Oaks, City of Nome, City of China, and adjacent counties and cities;
- Citizens who attended public meetings and provided contact information; and
- The organizations, agencies, and elected officials who received notices of public meetings.

9.2 Implementation

Through the mitigation planning process, the District Departments that are involved in managing hazards and implementing measures to minimize future risk considered a range of mitigation actions. High priority actions were identified and prioritized, and are shown in Table 7-1.

For each mitigation action, Table 7-1 identifies the lead agency, support agencies, priority level, and time period for implementation. Each lead agency is responsible for factoring the action into its work plan and schedule over the indicated time period. Annual reports on the status of implementation, including obstacles to progress, will be submitted by lead Departments to the Districts Assistant General Manager of Administration.

9.3 Monitoring & Progress Reports

The District is responsible for monitoring and preparing progress reports. The Assistant General Manager of Administration will note progress made on the mitigation action items listed in Table 7-1 in annual progress reports and record such progress in Appendix C. To this end, the Assistant General Manager of Administration may convene a meeting of the appropriate District, City of Beaumont and Jefferson County

Departments to discuss and determine progress, and to identify obstacles to progress, if any.

In addition to the scheduled reports, the Assistant General Manager of Administration will convene meetings after damage-causing natural hazard events to review the effects of such events. Based on those effects, adjustments to the mitigation priorities listed in Table 7-1 may be made or additional event-specific actions identified. Such revisions shall be documented as outlined in Section 9.4.

9.4 Incorporating Mitigation Plan Requirements into Other Local Planning Mechanisms

It should be noted that, in the State of Texas, Drainage Districts such as DD6, have very limited land use and zoning authority. With the recent changes to Chapter 49.211 of the Texas Water Code, via HB 919, Districts are required to adopt master drainage plans before adopting rules relating to the review and approval of proposed development drainage plans. This Master Drainage Plan and related Drainage Criteria Manual are currently under development. Mitigation plan requirements are being incorporated into this planning mechanism as well as into DD6' annual project planning and budgeting process.

9.5 Revisions

Revisions that warrant changing the text of this Plan or incorporating new information may be prompted by a number of circumstances, including identification of specific new mitigation projects, completion of several mitigation actions, or requirements for qualifying for specific funding. Minor revisions may be handled by addenda.

Major comprehensive review of and revisions to this Hazard Mitigation Plan will be considered on a five-year cycle. Adopted in 2004, the Plan will enter its next review cycle sometime in 2008, with adoption of revisions anticipated in 2009. The Mitigation Planning Committee will be convened to conduct the comprehensive evaluation and revision.

The District will involve the public in the plan maintenance process and during the major comprehensive review to the Plan in the same ways used during the original plan development. The public will be notified when the revision process is started and provided the opportunity to review and comment on changes to the plan and priority action items. It is expected that a combination of informational public meetings, surveys and questionnaires, draft documents posted on the web site, and public Board of Director meetings will be undertaken.

Appendix A
Mitigation Planning Committee Meeting Minutes

Summary of Mitigation Planning Committee Meeting #1 (November 19, 2003)

Jefferson County Drainage District No. Six (DD6) has begun a mitigation planning initiative. The Mitigation Planning Committee (Committee) is composed of members from appropriate agencies (list follows).

The Committee convened on November 19, 2003 for the first meeting to review and address the following:

1. What is mitigation planning and why the District undertaking this task. It is understood that the Plan will further build on federal and State efforts to reduce the effects of natural hazards; a new federal-level planning requirement was briefly described.
2. The planning process was outlined: identify hazards; identify what is at risk; evaluate current policies and procedures; evaluate what else can be done (or can be done differently).
3. Overview of common natural hazards: flood (from all sources, including hurricane, heavy rain, dam break), high wind, winter storms
4. Less common natural hazards: wild fires, earthquake (The area within the District's responsibility has low seismic risk).
5. Hazardous materials considered where location intersects with natural hazard (i.e., within flood hazard area).
6. Overview of disasters in the United States: occur in every state; nearly all jurisdictions have flood hazards; winter storms affect more people than floods; earthquakes are the most costly.
7. Uncounted costs of disasters: small events do not qualify for federal financial assistance; grants do not cover all costs; loan repayment costs far exceed insurance costs.
8. Define hazard identification & risk assessment: where do hazards occur, with what severity and frequency, and what is likely to be damaged.
9. Overview of the areas hazards:
    a. Location specific: mapped floodplains; hazardous materials
    b. District-wide: high wind; winter storm
10. Introduction of need for a mitigation goal; to be compatible with other District goals
11. Overview and examples of mitigation actions:
    a. Programmatic and planning
    b. Public infrastructure and buildings
    c. Public information
    d. Projects
12. Review steps in the mitigation planning process:
    a. Field visit to damage/vulnerable locations
    b. Interview each department (District, City, and County)
    c. Discuss opportunities
    d. Prioritize mitigation actions
    e. Get public input (process is still to be determined)
    f. Prepare, review and adopt plan
13. Schedule:
    - Second meeting of the Committee – To be Determined. All committee members will be given appropriate advance notice of the meeting time and place once it is finalized.

Jefferson County Drainage District No. Six (DD6) Planning Committee Membership

The following table lists the people that attended the first committee meeting. This group will participate in Committee meetings, gather and provide information to the consultant, review interim materials and drafts of the Plan, and evaluate potential mitigation actions in the context of their department's capabilities and responsibilities as well as the overall and long-term benefits of the District.

Name	Organization	Department	Phone	Email Address
Richard LeBlanc	DD6	General Manager, Executive Sponsor	409-842-1818	rpleblanc@dd6.org
Betty Holman	DD6	Asst. General Manager	409-842-1818	bsholman@dd6.org
Doug Canant	DD6	Engineering	409-842-1818	dscanant@dd6.org
Jim Terry	City of Beaumont	Streets and Drainage	409-838-5016	jterry@ci.beaumont.tx.us
Adina Abshire	City of Beaumont	Floodplain Management	409-880-3764	aabshire@ci.beaumont.tx.us
Don Rao	Jefferson County	Engineering	409-835-8585	drao@co.jefferson.tx.us
Butch Wilson	Leap Engineering	Consultant	409-813-1862	Butch.Wilson@leapengineering.com
Doug Landry	DD6	Engineering	409-842-1818	jdlandry@dd6.org
Jim Broussard	DD6	Asst General Manager Operations	409-842-1818	jlbroussard@dd6.org
Keith Corbin	DD6	Operations	409-842-1818	
Chuck Oakley	DD6	Accounting	409-842-1818	cwoakley@dd6.org
Candy Melancon	DD6	Secretary	409-842-1818	cemelancon@dd6.org
Jeff Wad	JSW & Assoc. Inc.	Consultant	239-784-6902	jeffreysward@earthink.net
Gilbert Ward	TWDB	Grantor	512-463-6418	Gilbert.Ward@twdb.state.tx.us

The following agencies were notified and invited to participate:

Texas Department of Emergency Management

Texas Water Development Board (will be invited to next committee meeting)

FEMA Region VI

Meeting Discussions

The majority of the meeting encompassed a presentation informing the committee members why they were developing the plan and preparing them for the role they will plan in the plan development. Future meetings will be much more interactive. During and after the presentation, there was discussion centered around the following:

Other incorporated areas within DD6's area of responsibility – It was highlighted that there are three other incorporated areas within DD6's area of responsibility – in addition to the City of Beaumont. These Cities include:

Nome
Bevel Oaks
China

The importance of including these areas is that they are NFIP participating communities and their policy-in-force data and loss data should be included in our hazard analysis. A summary of the relevant statistics from these incorporated areas will be provided at the next committee meeting.

In addition, committee members asked for a list of acronyms that were used during the presentation. The following acronyms were used during the presentation and will be used in the plan document:

CRS – Community Rating System (NFIP)

DEM – Texas Division of Emergency Management

FEMA – Federal Emergency Management Agency

FIRM – Flood Insurance Rate Map

FIS – Flood Insurance Study

FMA – Flood Mitigation Assistance (FEMA)

GIS – Geographic Information System

HMGP – Hazard Mitigation Grant Program (FEMA)

NFIP – National Flood Insurance Program (FEMA)

NOAA – National Oceanic and Atmospheric Administration

SFHA – Special Flood Hazard Area

TCEQ – Texas Commission on Environmental Quality

TWDB – Texas Water Development Board

Next Steps

As discussed above, the next meeting will be preceded by in-depth interviews with representatives from each department and pertinent program. These interviews will address each how the interviewee's job is affected by disasters in the area, their responsibility pre- and post-disaster, and their recollection of the historical disaster losses within the District.

The following is an overview of the next steps in the plan development process:
Conduct Interviews
Continue research
Develop Plan Mitigation Goal Statement
Begin some GIS work
Public meeting - To be determined
Committee Meeting #2 - To be determined
Review other adopted plans

Summary of Mitigation Planning Committee Meeting #2 (January 22, 2004)

Review of public questionnaire draft
Ways the District communicates with the public
What we know about flood (and other) hazards and how we will learn more
Drafting a mitigation goal statement
Begin talking about possible mitigation actions
Review next steps

Jefferson County Drainage District No. Six (DD6) Planning Committee Membership

The following table lists the people that attended the second committee meeting. This group will participate in Committee meetings, gather and provide information to the consultant, review interim materials and drafts of the Plan, and evaluate potential mitigation actions in the context of their department's capabilities and responsibilities as well as the overall and long-term benefits of the District.

Name	Organization	Department	Phone	Email Address
Richard LeBlanc	DD6	General Manager, Executive Sponsor	409-842-1818	rpleblanc@dd6.org
Betty Holman	DD6	Asst. General Manager	409-842-1818	bsholman@dd6.org
Doug Canant	DD6	Engineering	409-842-1818	dscanant@dd6.org
Jim Terry	City of Beaumont	Streets and Drainage	409-838-5016 409-781-3133	jterry@ci.beaumont.tx.us
Adina Abshire	City of Beaumont	Floodplain Management	409-880-3764 409-880-3133	
Don Rao	Jefferson County	Engineering	409-835-8584	drao@co.jefferson.tx.us
Butch Wilson	Leap Engineering	Consultant	409-813-1862	Butch.Wilson@leapengineering.com
Doug Landry	DD6	Engineering	409-842-1818	jdlandry@dd6.org
Keith Corbin	DD6	Operations	409-842-1818	
Chuck Oakley	DD6	Accounting	409-842-1818	cwoakley@dd6.org
Candy Melancon	DD6	Secretary	409-842-1818	cemelancon@dd6.org
Jeff Ward	JSW & Assoc. Inc.	Consultant	239-784-6902	jeffreysward@earthink.net
Andrew Jones	DD6	Operations	409-842-1818	ajones@dd6.org

Meeting Discussions

Review of public questionnaire draft

The planning process that DD6 will use includes a questionnaire to solicit additional public input and comment. The draft of the proposed questionnaire was reviewed as well as the recommendations on extent and type of distribution.

In general the committee believed that questionnaire would be an effective tool to get additional public input. Comments on the questionnaire are as follows:

- Include a question on how deep the water has gotten in the house during previous floods
- Add additional space for listing the dates of prior flooding
- Include a place for address of work if it has flooded previously
- Remove the question regarding roads where they have seen flooding
- Add other Cities to question 19 regarding public knowledge of permit requirements

All of these recommendations have been incorporated into the revised draft questionnaire.

There was additional discussion regarding the recommended distribution of the questionnaire. The following avenues for distribution were discussed:

- Post on DD6's web site
- Inform people on the local news (TV and radio) that the questionnaire is available for completion on DD6's web site or for pick up at local convenience stores
- Include survey in water bills
- Allow return by fax, mail, and drop points at places such as 777 stores

The revised questionnaire and finalization of distribution will be discussed and decided upon at the next committee meeting. A copy of the revised draft questionnaire is attached to these minutes.

Ways the District communicates with the public

The committee discussed the current communication methods used before, during, and after an event. The following is a list of communication methods currently employed:

- DD6 and City of Beaumont have web sites that have hazard related data on them. In addition, DD6 has a site that list stream gauges and rainfall amounts throughout the District
- DD6, County, and City departments receive and respond to phone calls from public
- City of Beaumont has a Government Access Channel on local cable network
- Southeast Texas Alerting Network (STAN) is used to communicate to public before, during, and after an event. Emergency Management posts a recorded message on STAN that is distributed to local news (TV and radio) with a highlight of the message and a number to call for additional information
- Radio stations that carry STAN related broadcasts are KLVI and AM 530 – residents are used to tuning in to the radio to get hazard information
- Both the City of Beaumont and Jefferson County have FEMA publications about flood hazards and permit requirements at the permit counter
- There are seven TXDOT message boards on major highways that alert residents to local hazards
- DD6 attends community meetings upon request

What we know about flood (and other) hazards and how we will learn more

The committee provided insight on historical hazards that have affected the area. A highlight follows:

- Data from FEMA regarding Presidential Disaster Declarations show that Jefferson County has had twelve disaster declarations

- The most recent declaration was the October 2002 event (DR 1439) – this event was a 25-year event in the Jefferson County area producing 6-7 inches of rain in a 4-hour period – many homes were damaged as a result
- The following is a list of the paid claims in Jefferson County and the City of Beaumont from prior flood events:
    - Paid Claims 5,323 (3,351 Bldg, 1,972 contents)
        - Jefferson County 692 (417 Bldg, 275 contents)
        - City of Beaumont 4,631 (2,934 Bldg, 1,697 contents)
    - Total Payments $ 45,438,487
        - Jefferson County $ 6,233,434
        - City of Beaumont $ 39,205,053

Note: Data for City of Nome and City of Bevil Oaks will be included in the final calculations

- In January 1997 there was a large ice storm that had electric out in many areas for up to one week
- In the late 60's or early 70's there was an explosion at the Exxon Mobile plant

The committee discussed other hazards they feel are a potential threat in the area. This list includes:

- The area has a great deal of HazMat traffic both on highways and railways
- Due to the large number of chemical plants and refineries in the area, explosions are always a risk
- Drought and heat related deaths are a potential concern
- The area has had few tornadoes, but there is a potential for damaging tornadoes in the are
- The consensus was that floods are the areas greatest risk for property damage and loss of life. Unnamed events and Tropical storms have historically caused more damage (primarily flood related) than hurricanes
- Roads in the area are designed to carry and hold water. There is a high risk of injury and loss of life due to people attempting to drive through flood streets. In fact, the last hazard related death was due to a woman attempting to drive through a flooded intersection (2003)

The committee was informed that additional information on historical hazards will be obtained through interviews with key District, City, and County staff, the NOAA database, FEMA's hazard history data, and other open sources.

Drafting a mitigation goal statement

Before the meeting a handout with background information on mitigation goal statements was provided to help facilitate the discussion. This handout included the concept behind a goal statement, FEMA and the State of Texas' mitigation goal, and examples of local mitigation goal statements form other jurisdiction's local plans.

After some discussion, the committee converged on a combination of two of the examples as being close to what they believe should be the goal. Committee members provided recommended revisions to the examples and it was agreed that Jeff Ward would develop a draft goal statement based on the discussion and distribute this for review. The following draft goal statement was developed and will be discussed at committee

meeting number 3 and statement will be sent to committee members in a separate communication for review and comment:

"The goals of the District are:

- To protect public health, safety, and welfare;
- To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
- To facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems;
- To seek solutions to existing problems."

Begin talking about possible mitigation actions

The committee began brainstorming possible mitigation action items they may want included in the plan. The following lists the items that were discussed and/or suggested by committee members.

- Increase predictive capability in Bayous that do not have sufficient coverage
- Re-model areas where data is thought to be inaccurate or incomplete

A more detailed list will be generated at the 3rd committee meeting followed by an eventual prioritization of agreed upon mitigation actions.

Next Steps

The committee was informed that interviews would be conducted with key people for DD6, City of Beaumont, and Jefferson County. Since committee meeting number 2, eleven interviews have been conducted. These interviews addressed how the interviewee's job is affected by disasters in the area, their responsibility pre- and post-disaster, and their recollection of the historical disaster losses within the District. Additional interviews will be conducted.

The following is an overview of the next steps in the plan development process:

- Finish Interviews
- Continue research
- Continue writing draft document
- Agree upon Mitigation Goal Statement
- Begin GIS work
- Public meeting - To be determined
- Committee Meeting #3 - To be determined

Summary of Mitigation Planning Committee Meeting #3 (February 24, 2004)

- **Review minutes of Meeting #2**
- Review of update public questionnaire draft
  - Discuss distribution
- Review interview notes
- Review and approve mitigation goal statement
- Discuss possible mitigation actions

Jefferson County Drainage District No. Six (DD6) Planning Committee Membership

The following table lists the people that attended the second committee meeting. This group will participate in Committee meetings, gather and provide information to the consultant, review interim materials and drafts of the Plan, and evaluate potential mitigation actions in the context of their department's capabilities and responsibilities as well as the overall and long-term benefits of the District.

Name	Organization	Department	Phone	Email Address
Richard LeBlanc	DD6	General Manager, Executive Sponsor	409-842-1818	rpleblanc@dd6.org
Betty Holman	DD6	Asst. General Manager	409-842-1818	bsholman@dd6.org
Doug Canant	DD6	Engineering	409-842-1818	dscanant@dd6.org
Adina Abshire	City of Beaumont	Floodplain Management	409-880-3764 409-880-3133	
Butch Wilson	Leap Engineering	Consultant	409-813-1862	Butch.Wilson@leapengineering.com
Chuck Oakley	DD6	Accounting	409-842-1818	cwoakley@dd6.org
Candy Melancon	DD6	Secretary	409-842-1818	cemelancon@dd6.org
Jeff Ward	JSW & Assoc. Inc.	Consultant	239-784-6902	jeffreysward@earthink.net
Andrew Jones	DD6	Operations	409-842-1818	ajones@dd6.org

Meeting Discussions

Review minutes of Meeting #2
There were no questions or concerns with meeting 2 minutes

Review of update public questionnaire draft (Discuss distribution)
The committee had a couple of additional suggested changes to the questionnaire. These were made and we moved on to discuss distribution. The following were suggested:

- Send in water bills – Betty is checking on lead time and schedule
- Allow people to respond by fax, mail, email, or drop at Lucky 7 stores in the City
- Approach local TV stations to see if they would run a promo that the questionnaires are out – Betty took the lead on this
- Post on DD6's web site

Review interview notes

There were a couple of corrections suggested, which have been made. Revised interview notes will be distributed.

Review and approve mitigation goal statement

The revised Mitigation Goal Statement was reviewed and approved by the committee. The approved mitigation goal statement follows:

The mitigation goals of the District are:

- To protect public health, safety, and welfare;
- To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
- To facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems;
- To seek solutions to existing problems.

Discuss possible mitigation actions

The team was presented with a set of potential mitigation action items that were developed from knowledge of the District, Interviews, and mitigation action items from other mitigation plans. The following mitigation action items were tentatively decided upon:

Pre-Flood Mitigation Programs

- Collect "sunny day" data for at-risk buildings (photographs, elevation information/certificates)
- Continue to pursue cost effective flood mitigation projects (elevation, buyout, local drainage and storm water detention projects); apply for federal funding, as appropriate. Focus on areas known to be flood-prone/Repetitive Loss areas
- Work with National Weather Service to augment and perfect Pine Island Bayou Modeling
- Formalize procedures on DD6 roles and responsibilities before, during, and after a flood event
- Increase coordination with the City and County regarding flood predictions and post event recovery

Encouraging Property Owner Responsibility:

- Periodic informational mailings to SFHA property owners (flood insurance, importance of maintaining drainage, flood safety, easy mitigation measures, permit requirements)
- Conduct homeowner workshops on retrofitting & low cost measures
- Sponsor flood-proofing workshops for non-residential property owners (if any are identified as in the SFHA)
- Facilitate local public school development and delivery of classes on hazards and mitigation measures - school science and social studies curricula.

Public Safety:

- Increase flood predictive capability for streams and creeks that affect the District (stream gages).
- Identify whether hazardous materials handlers/waste sites are in the mapped floodplain; if flood-prone, notify company and encourage protective measures.

Master Drainage Plan Development:

- Develop and adopt a master drainage plan in order for DD6 to exercise the authority granted to drainage districts under Chapter 49.211 of the Texas Water Code. Chapter 49.211 requires districts to adopt master drainage plans before adopting rules relating to the review and approval of proposed development drainage plans

Community Rating System:

- Encourage the City of Beaumont and Jefferson County to enter the CRS program. Assist in the application development, as appropriate.

Geographic Information System Technology:

- GIS is a computerized mapping and analysis tool. Improved mapping and information enhance administration of building codes, land use plans, and efforts to identify priority mitigation actions and alternatives. When hazards affect specific areas, mailing lists can be tailored to make sure the right message goes to the right people. Enhance DD6's internal GIS capabilities.

Codes & Regulations:

- Sponsor building code training (available from code organizations) for local engineers, architects, contractors, home improvement contractors (with emphasis on wind and flood provisions)
- One member of DD6 engineering staff required to be a Texas CFM

These tentative action items will be sent to the committee for further evaluation and prioritization.

Summary of Mitigation Planning Committee Meeting #4 (May 5, 2004)

- **Review minutes of Meeting #3**
- Update of public questionnaire responses
- Review Mitigation Action Ranking
- Linking Actions to Goals
- Review Communication Flyer

Jefferson County Drainage District No. Six (DD6) Planning Committee Membership

The following table lists the people that attended the second committee meeting. This group will participate in Committee meetings, gather and provide information to the consultant, review interim materials and drafts of the Plan, and evaluate potential mitigation actions in the context of their department's capabilities and responsibilities as well as the overall and long-term benefits of the District.

Name	Organization	Department	Phone	Email Address
Richard LeBlanc	DD6	General Manager, Executive Sponsor	409-842-1818	rpleblanc@dd6.org
Betty Holman	DD6	Asst. General Manager	409-842-1818	bsholman@dd6.org
Doug Canant	DD6	Engineering	409-842-1818	dscanant@dd6.org
Adina Abshire	City of Beaumont	Floodplain Management	409-880-3764 409-880-3133	
Chuck Oakley	DD6	Accounting	409-842-1818	cwoakley@dd6.org
Candy Melancon	DD6	Secretary	409-842-1818	cemelancon@dd6.org
Jeff Ward	JSW & Assoc. Inc.	Consultant	239-784-6902	jeffreysward@earthink.net
Jim Terry	City of Beaumont	Streets and Drainage	409-838-5016	jterry@ci.beaumont.tx.us
Don Rao	Jefferson County	Engineering	409-835-8585	drao@co.jefferson.tx.us

Meeting Discussions

Review minutes of Meeting #3

There were no questions or concerns with meeting 3 minutes

Update of public questionnaire responses

Betty provided the committee an update of the public questionnaire responses received to date the plan for getting additional public input. To date, we have received over 100 responses from door-to-door delivery of questionnaires. This plan includes the inclusion o the public questionnaire in City of Beaumont water bills in the month of June.

Review Mitigation Action Ranking

The following is the summary chart of committee member action item rankings. Please note, after discussion, the committee voted to remove two actions from further consideration. These actions were: Sponsor building code training (available from code organizations) for local engineers, architects, contractors, home improvement contractors (with emphasis on wind and flood provisions); Sponsor flood-proofing workshops for non-residential property owners (if any are identified as in the SFHA); and Facilitate local public school development and delivery of classes on hazards and mitigation measures - school science and social studies curricula. The chart below is in prior

	Respondent	Richard LeBlanc	Betty Holman	Doug Canant	Chuck Oakley	Jim Terry	Don Rao	Adina Abshire	Butch Wilson	Average	Comment	Proposed Ranking
1.b.	Continue to pursue cost effective flood mitigation projects (elevation, buyout, local drainage and storm water detention projects); apply for federal funding, as appropriate. Focus on areas known to be flood-prone/Repetitive Loss areas.	3	3	3	3	3	3	3	3	3.00		High
1.d.	Formalize procedures on how DD6 roles and responsibilities before, during, and after a flood event	3	3	3	3	3	N	3	N	3.00		High
4.a.	Develop and adopt a master drainage plan in order for DD6 to exercise the authority granted to drainage districts under Chapter 49.211 of the Texas Water Code. Chapter 49.211 requires districts to adopt master drainage plans before adopting rules relating to the review and approval of proposed development drainage plans	3	3	3	3	N	3	3	3	3.00		High
1.c.	Work with National Weather Service to augment and perfect Pine Island Bayou Modeling	3	3	3	3	2	2	N	2	2.57		High
2.a.	Periodic informational mailings to SFHA property owners (flood insurance, importance of maintaining drainage, flood safety, easy mitigation measures, permit requirements)	3	3	1	3	3	N	3	2	2.57		High
6.a.	GIS is a computerized mapping and analysis tool. Improved mapping and information enhance administration of building codes, land use plans, and efforts to identify priority mitigation actions and alternatives. When hazards affect specific areas, mailing lists can be tailored to make sure the right message goes to the right people. Enhance DD6's internal GIS capabilities	2	3	3	2	3	1	3	3	2.50		High
7.b.	One member of DD6 engineering staff required to be a Texas CFM	3	2	1	3	N	3	3	N	2.50		Medium
2.b.	Conduct homeowner workshops on retrofitting & low cost measures	2	3	D	1	N	N	3	3	2.40	Note - 1 D	Medium
1.e.	Increase coordination with the City and County regarding flood predictions and post event recovery	3	2	1	3	3	1	3	N	2.29		Medium
5.a.	Encourage the City of Beaumont and Jefferson County to enter the CRS program. Assist in the application development, as appropriate	1	3	3	2	3	1	3	2	2.25		Medium
3.a.	Increase flood predictive capability for streams and creeks that affect the District (stream gages).	D	2	D	1	N	2	N	3	2.00	Note - 2 Ds	Medium
7.a.	Sponsor building code training (available from code organizations) for local engineers, architects, contractors, home improvement contractors (with emphasis on wind and flood provisions)	3	1	1	2	2	N	3	1	1.86	Committee Recommended Dropping	Low
2.c.	Sponsor flood-proofing workshops for non-residential property owners (if any are identified as in the SFHA)	1	2	D	1	1	N	3	3	1.83	Committee Recommended Dropping	Low
1.a	Collect "sunny day" data for at-risk buildings (photographs, elevation information/certificates)	N	2	1	1	2	1	3	2	1.71		Low
3.b.	Identify whether hazardous materials handlers/waste sites are in the mapped floodplain; if flood-prone, notify company and encourage protective measures.	1	2	1	1	2	1	3	2	1.63		Low
2.d.	delivery of classes on hazards and mitigation measures - school science and social studies curricula.	1	2	D	1	2	N	2	1	1.50	Committee Recommended Dropping	Low

Linking Actions to Goals

The committee reviewed the elements of the mitigation goal statement and compared each action item to these goal statement elements. Each action was linked to one or more elements of the goal statement. The following table shows the results of this exercise.

Linking Actions to Goal Statement

	The mitigation goals of the District are:
1	To protect public health, safety, and welfare;
2	To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
3	To facilitate the development review and approval process to accommodate growth in a practical way that recognizes existing stormwater and floodplain problems while avoiding creating new problems or worsening existing problems;
4	To seek solutions to existing problems.

1	1.b., 1.c., 2.a., 1.e., 3.a., 3.b.
2	1.b., 1.d., 1.c., 2.a., 2.b., 1.3., 5.a., 3.a., 1.a., 3.b.
3	4.a., 6.a., 7.b., 1.e.
4	1.b., 6.a., 7.b., 1.e., 1.a., 3.b.

Review Communication Flyer

Examples of communication flyers used for other jurisdictions were provided to DD6 management for review and dissemination. DD6 will provide markups of these flyers for development of drafts that are DD6 specific.

Summary of Mitigation Planning Committee Meeting #5 (August 5, 2004)

- Review meeting minutes from May 5th meeting
- Review GIS based maps
- Overview plan contents
- Discuss open items
- Discuss public meeting time and presentation
- Approve draft plan release for public review

Jefferson County Drainage District No. Six (DD6) Planning Committee Membership

The following table lists the people that attended the fifth committee meeting.

Name	Organization	Department	Phone	Email Address
Betty Holman	DD6	Asst. General Manager	409-842-1818	bsholman@dd6.org
Doug Canant	DD6	Engineering	409-842-1818	dscanant@dd6.org
Adina Abshire	City of Beaumont	Floodplain Management	409-880-3764 409-880-3133	
Chuck Oakley	DD6	Accounting	409-842-1818	cwoakley@dd6.org
Candy Melancon	DD6	Secretary	409-842-1818	cemelancon@dd6.org
Jeff Ward	JSW & Assoc. Inc.	Consultant	239-784-6902	jeffreysward@earthink.net
Don Rao	Jefferson County	Engineering	409-835-8585	drao@co.jefferson.tx.us

Gilbert Ward from Texas Water Development Board (TWDB) and Bart Moore from FEMA Region VI also attended the meeting.

Meeting Discussions

Review minutes of Meeting #4

There were no questions or concerns with meeting minutes.

Review GIS based maps

The team reviewed the maps developed by JCAD engineering department. These maps were developed using GIS tools with overlays of JCAD data and FEMA's repetitive loss list. Maps showing DD6 boundaries (with and without floodplain) and one with a plot of all repetitive loss list properties were reviewed. The team agreed that these maps were appropriate for use in the plan.

Overview Plan Contents

The following items were provided as an overview of recent accomplishments and next steps:

- Questionnaire summary complete
- GIS based maps complete
- Action items complete
- Next steps

- Release plan for public review and comment
- Hold board work session
- Hold public meeting
- Submit plan to TWDB and DHS for review

Discuss Open Items

Open items/needs for completion of the draft plan were discussed. With the exception of compiling the data for computing the dollar value of properties at risk from flooding, all items were closed during the meeting. It was agreed that Jeff and Doug Canant would meet the next morning to resolve this last open item. This meeting was held and the issue was resolved.

Approve draft plan release for public review

The team voted unanimously agreed the draft plan was ready for release for public review.

Discuss public meeting time and presentation

Given the time required to complete public notice requirements and to give the public ample time to review and comment on the draft plan, it was agreed a public meeting would be scheduled for mid-September. In preparation for this public meeting, the draft will be completed and released by 20 August.

Appendix B
Public Outreach Materials

Questionnaire & Summary of Comments

TELL US WHAT YOU KNOW ABOUT FLOODING AND OTHER HAZARDS IN THE JEFFERSON COUNTY AND SHARE YOUR IDEAS ABOUT REDUCING FUTURE DAMAGE

Jefferson County Drainage District Number six (DD6) has secured grant funding from state sources to prepare a plan to help address damage from hazards and safety risks. Part of our planning process is to utilize this questionnaire to collect information about hazards in your community. As you will notice, the majority of questions are related to flooding, since this has historically been the hazard with the greatest impact within Jefferson County and its incorporated cities. However, we are interested in your assessment of all hazards and their historical and future potential impacts. Your input is an important part of the planning process. We will hold a public meeting to present the draft plan later this year. At that time you will learn about mitigation planning and proposals.

You can help us now. We would like to learn about problems you may have had at your home or business. Please take a few minutes and answer the following questions. Please submit your responses by Close of Business on _____.

PLEASE MAIL TO: Betty Holman at P.O. Box 20078, Beaumont, TX 77720
OR FAX TO: 409-842-2729

Name: _____

Address: _____

Email: _____

OUR QUESTIONS	YOUR ANSWERS
1. Please review the list of hazards to the right. Please let us know which hazards you think are significant threats in our area by marking the boxes: **V** = Very significant **S** = Significant or somewhat significant **N** = Not a threat to our area	Flood Wildland Fire Hail Winter Storm Hazardous Materials Terrorism Pipeline Accident Tornado and High Wind Urban Fire Transportation Accident Utility Outage Train Derailment Drought and Extreme Heat
2. Is there another hazard not listed above that you think is a wide-scale threat to our area or your neighborhood?	

OUR QUESTIONS	YOUR ANSWERS
3. Has any hazard in your neighborhood increased in severity in recent years? Please explain:	
4. Do you own or rent?	□ Own □ Rent
5. How would you describe your home?	□ On a crawlspace On a slab Manufactured Home □ On wood pilings or block piers Has a basement □ I don't know □ Other:
6. Is your home in the floodplain?	□ Yes □ No □ Don't know
7. What is the source of flooding?	□ Name of stream or river _____ □ Poor drainage (standing water, overflowing ditches)
8. If your home has actually flooded, when did it happen? (please use additional paper if needed).	List dates:
9. Describe the damage (please use additional paper if needed).	
10. Indicate how deep the water got in the house from each event listed in # 8 and # 9 above (please use additional paper if needed).	
11. Have you done anything to your home to reduce future damage?	Please describe:
12. In the last flood, did you have flood insurance?	□ Yes □ No
13. Do you now have flood insurance?	□ Yes □ No
14. If you don't have flood insurance, why not?	
15. Is your business or place of work in the floodplain?	□ Yes □ No □ Don't know

OUR QUESTIONS	YOUR ANSWERS
16. If it has actually flooded, describe the damage and provide address of property.	Damage: Business address:
17. Describe other flooding problems you know about (such as flooded septic fields, water wells, etc.)	
18. Please give us your ideas to reduce the impacts of hazards.	
19. Do you know about Jefferson County or Incorporated City permit requirements? A permit is required if you want to: Build a new building (even a garage or shed); build an addition to an existing building, make renovations/ repairs.	□ Yes, I know about permits. □ Please send me more information (address or email above).

Summary of Comments Submitted in Response to Questionnaire:

- Ditches need to be dug deeper and new drainage systems installed
- Flooding seems to be happening more often now than it did before
- Flooding in the North end of Beaumont seems to be worsening
- Too much concrete is being put down – water has no place to go
- Streets throughout the area flood even during small storms
- Seems to be an increase in runoff due to development
- Pine Island Bayou needs to be dredged
- There is a great deal of debris in Pine Island Bayou
- Drainage to Pine Island Bayou needs to be improved
- Storm drains must be kept free of debris
- Drainage ditches must be better maintained
- The Drainage District should plan for new drainage with the developers so development does not cause flooding in other areas
- Highways and railroads should not be allowed to block the natural floodplain
- New houses being built at higher elevations than existing houses increasing flooding in these older houses
- St. Elizabeth Hospital's emergency room has experienced significant flood damage
- When it rains a lot the sewer systems seems to backing up – can't use plumbing and/or backing up into yards and houses

Appendix C
Periodic Progress Reports

Annual status reports will be prepared, reviewed by the appropriate District officials, and forwarded to the Texas Division of Management and the Texas Water Development Board. The reports will be noted below and copies will be inserted in this appendix.

Comprehensive review and revisions to the Hazard Mitigation Plan will be considered on a 5-year cycle.

Date of Progress Report	**Summary of Progress Accomplished**