



RECEIVED

AUG 11 2010

TWDB

August 10, 2010

Mr. J. Kevin Ward, Executive Administrator
Texas Water Development Board
P O Box 13231
Austin, TX 78711-3231

Dear Mr. Ward:

As Coordinator for Groundwater Management Area (GMA) 10, I want to inform you that GMA 10 has formally adopted Desired Future Condition (DFC) for the Leona Aquifer in Medina County of GMA 10.

After reviewing "*GTA Aquifer Assessment 09-01*", all groundwater conservation district (GCD) representatives in attendance, eight of the nine members of the Joint Coordinating Committee of GMA 10, voted unanimously on May 17, 2010, to adopt a DFC for the Leona Aquifer in Medina County of GMA 10 of an average drawdown of fifteen feet.

Enclosed please find the following items related to the DFC adoption for the record:

- Copies of posted meeting notices and sign-in sheets for the May 17, 2010 meeting (Exhibit A);
- Minutes of the July 19, 2010 meeting (Exhibit B);
- Resolution No. 2010-01 with signatures of all attending GCD representatives (Exhibit C); and
- Copy of "*GTA Aquifer Assessment 09-01*" (Exhibit D).

If there are any additional submission requirements necessary, please contact me at (210) 222-2204 or you may e-mail me at rillgner@edwardsaquifer.org.

Respectfully,

Rick Illgner
Governmental Affairs Officer
Edwards Aquifer Authority

RI/em

Enclosures



Groundwater Management Area #10 Joint Planning Meeting

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 10 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 10: Edwards Aquifer Authority, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Plum Creek CD, Barton Springs Edwards Aquifer CD, Hays Trinity GCD, Trinity Glen Rose GCD and Kinney County GCD will be held on Monday, May 17, 2010 at 11:30 am at the Conference Center of the Edwards Aquifer Authority, 1615 N. St. Mary's, San Antonio, TX 78215.

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Call to Order.
2. Designation of meeting Secretary.
3. Public Comment.
4. Receipt of Posted Notices.
5. Approval of April 19, 2010 Minutes.
6. Discussion and possible action related to establishing standard terminology for the various stages of a specific DFC of GMA 10.
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14. Discussion and possible action concerning the schedule and location of upcoming public hearings on Preliminary Recommended DFCs that are planned by member GCDs.
15. Next Meeting and Discussion Topics.
16. Adjournment

Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222 -9869

FILED

6th day of MAY A. D. 2010

11:45 o'clock P. M.

JOHN E. C. HUTCHERSON

County Clerk, Uvalde County, Texas

15 | Brenda Gilman

Deputy

Groundwater Management Area #10 Joint Planning Meeting

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Edwards Aquifer Authority

FILED this 4th day of May 2010
2:40 P M Phone (210) 222-2204

Fax (210) 222 -9869

NINA S. SELLS

COUNTY CLERK CALDWELL COUNTY TEXAS

By [Signature]

Groundwater Management Area #10 Joint Planning Meeting

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Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222-9869

FROM : FAX NO. :8302493472 May. 06 2010 01:20PM P1

May 06 2010 13:56 Trinity Glen Rose GCD 210.698.1159 p.2

Trinity Glen Rose Groundwater Conservation District

6335 Camp Bullis Rd. Suite #25 San Antonio, Texas 78257 (210) 698-1155 Fax (210) 698-1159

Groundwater Management Area Joint Planning Meeting

Monday, May 17, 2010 11:30 A.M.

Notice is given that one or more members of the Board of Directors and/or their designated representatives and/or Staff of the Trinity Glen Rose Groundwater Conservation District (TGRGCD) will attend a meeting of Groundwater Management Area #10 for purposes of discussing and/or conducting joint planning in compliance with the requirements of HB 1763, which was passed during the 2005 Texas Legislative Session. This meeting will be held at the Edwards Aquifer Authority, located at Conference Center of the Edwards Aquifer Authority, 1615 N. St. Mary's, San Antonio, TX 78215 on Monday, May 17, 2010 at 11:30 a.m. for the following purposes:

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Kendall County
 DARLENE HERRIN
 COUNTY CLERK
 On: 05/06/2010 1:11PM
 By: Harriet P Seidensticker, Deputy
 County Clerk

Posted at the TGRGCD office, TGRGCD Website, Bexar County, Kendall County and Comal County Courthouses, on this, the 6th day of May, 2010.

General Manager, Trinity Glen Rose Groundwater Conservation District

The Trinity Glen Rose Groundwater Conservation District is committed to compliance with the Americans with Disabilities Act (ADA). Reasonable accommodations and equal opportunity for effective communications will be provided upon request. Please contact the District Representative at 210-219-5555 at least 24 hours in advance if accommodation is needed.

FROM : COMAL COUNTY CLERK

FAX NO. : 830 620 3410

May. 10 2010 09:13AM P4

May 06 2010 13:54

Trinity Glen Rose GCD

210.698.1159

P.2

Trinity Glen Rose Groundwater Conservation District

6335 Camp Bullis Rd. Suite #25 San Antonio, Texas 78257 (210) 698-1155 Fax (210) 698-1159

Groundwater Management Area Joint Planning Meeting

Monday, May 17, 2010 11:30 A.M.

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15. Next Meeting and Discussion Topics.
16. Adjournment

Posted at the TORGCD office, TORGCD Website, Bexar County, Kendall County and Comal County Courthouses, on this, the 6th day of May, 2010.

George Williams 5-6-10
General Manager, Trinity Glen Rose Groundwater Conservation District

COMAL COUNTY CLERK
2010 MAY 6 PM 2:51

The Trinity Glen Rose Groundwater Conservation District is committed to compliance with the Americans with Disabilities Act (ADA). Reasonable accommodations and equal opportunity for effective communications will be provided upon request. Please contact the District Representative at 210-219-5355 at least 24 hours in advance if accommodation is needed.

Trinity Glen Rose Groundwater Conservation District
6335 Camp Bulls Rd. Suite #25 San Antonio, Texas 78257 (210) 698-1155 Fax (210) 698-1159

Groundwater Management Area Joint Planning Meeting
Monday, May 17, 2010 11:30 A.M.

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 5-6-10
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Doc# 13888 Fees: \$2.00
05/06/2010 3:59PM # Pages 1
Filed & Recorded in the Official Public
Records of BEXAR COUNTY
GERARD RICKHOFF COUNTY CLERK

NOT RECORDED

Groundwater Management Area #10 Joint Planning Meeting

NOTICE OF OPEN MEETING

As required by section 36.108(e), Texas Water Code, a meeting of the Groundwater Management Area 10 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 10: Edwards Aquifer Authority, Guadalupe County GCD, **Medina County GCD**, Uvalde County UWCD, Plum Creek CD, Barton Springs Edwards Aquifer CD, Hays Trinity GCD, Trinity Glen Rose GCD and Kinney County GCD will be held on **Monday, May 17, 2010 at 11:30 am** at the Conference Center of the Edwards Aquifer Authority, 1615 N. St. Mary's, San Antonio, TX 78215.

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15. Next Meeting and Discussion Topics.
16. Adjournment

Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222 -9869

POSTED IN MY OFFICE
LISA J. WERNETTE

MAY 06 '10 PM -3 40

COUNTY CLERK, MEDINA CO.



Hays Trinity
Groundwater
Conservation
District

Accepted for Filing in:
Hays County
On: May 04, 2010 at 02:17P
By:
Rose Robinson

Groundwater Management Area #10 Joint Planning Meeting

Date: Monday, May 17, 2010

Time: 11:30 am

Place: Conference Center of the Edwards Aquifer Authority

Located at: 1815 N. St. Mary's, San Antonio, TX 78215

As required by section 38.108(e), Texas Water Code, a meeting of the Groundwater Management Area 10 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 10: Edwards Aquifer Authority, Guadalupe County GCD, Medina County GCD, Uvalde County LWCD, Plum Creek CD, Barton Springs Edwards Aquifer CD, Hays Trinity GCD, Trinity Glen Rose GCD and Kinney County GCD will be held.

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Adjourn

The Board of Directors of the Hays Trinity Conservation District reserves the right to go into Executive Session at any time during the course of this meeting to discuss any of the matters listed on this agenda, as authorized by the Texas Open Meetings Act, Chapter 551, Government Code. No vote taken or action will be made in Executive Session.

The Hays Trinity Groundwater Conservation District is committed to compliance with the Americans with Disabilities Act (ADA). Reasonable accommodations and equal opportunity for effective communications will be provided upon request. Please contact the District office at 512-858-9253 at least 24 hours in advance if accommodation is needed.

This notice has been posted on a bulletin board at a place convenient to the public in the Hays County Courthouse and outside the main entrance to the District office not less than three (3) days prior to the scheduled meeting in accordance with the provisions of the Texas Open Meetings Act, Chapter 551, Government Code.

Posted by: Dana H. Carrigan

Center Lake Business Park: 14101 Hwy 290 W, Bldg. 100, Ste. #212, Austin, Texas 78737

Mail: P. O. Box 1848 Dripping Springs, TX 78620

E-mail: manager@haysgroundwater.com Phone: 512-858-9253 Fax: 512-858-2384 website: haysgroundwater.com

Groundwater Management Area #10 Joint Planning Meeting

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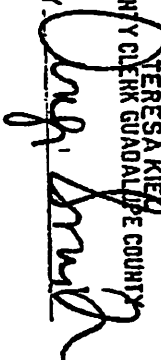
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Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222 -9869

BY  TERESA KIED
COUNTY CLERK GUADALUPE COUNTY

FILED FOR RECORD
10 MAY -4 PM 2:54

FILED
2010 MAY -6 PM 1:01

NOTICE OF OPEN MEETINGS

Groundwater Management Area #10 Joint Planning Meeting


Monday, May 17, 2010 at 11:30 a.m.

Notice is given that an open meeting of Groundwater Conservation Districts that are located within the State of Texas Groundwater Management Area #10, with one or more members of the Board of Directors and/or its designated representative and/or staff of the **Barton Springs Edwards Aquifer Conservation District** in attendance, for purposes of discussing and/or conducting joint planning concerning desired future conditions, in compliance with Texas Water Code, Chapter 36.108. This meeting will be held on **Monday, May 17, 2010 at 11:30 am at the Conference Center of the Edwards Aquifer Authority, 1615 N. St. Mary's, San Antonio, TX 78215.**

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Came to hand and posted on a Bulletin Board in the Courthouse, Travis County, Texas, on this, the 6th day of May, 2010 at 1:05 p.m.



Laura Ferguson
LAURA FERGUSON, Deputy Clerk
 Travis County, TEXAS

Groundwater Management Area #10 Joint Planning Meeting



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11. Discussion and possible action related to the adoption of the DFC for the Leona Gravel and Related Aquifers in Medina County.
12. Discussion and possible action related to establishing a Preliminary DFC for the Leona Gravel and Related Aquifers in Uvalde County.
13. Discussion and possible action related to designating and establishing Preliminary DFC(s) for the relevant aquifers in the Western Subdivision of GMA-10 and in Kinney County.
14. Discussion and possible action concerning the schedule and location of upcoming public hearings on Preliminary Recommended DFCs that are planned by member GCDs.
15. Next Meeting and Discussion Topics.
16. Adjournment



Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222 -9869

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GERARD RICKHOFF COUNTY CLERK

Groundwater Management Area #10 Joint Planning Meeting

NOTICE OF OPEN MEETING

As required by section 36.108(c), Texas Water Code, a meeting of the Groundwater Management Area 10 Planning Committee, comprised of delegates from the following groundwater conservation districts located wholly or partially within Groundwater Management Area 10: Edwards Aquifer Authority, Guadalupe County GCD, Medina County GCD, Uvalde County UWCD, Plum Creek CD, Barton Springs Edwards Aquifer CD, Hays Trinity GCD, Trinity Glen Rose GCD and Kinney County GCD will be held on Monday, May 17, 2010 at 11:30 am at the Conference Center of the Edwards Aquifer Authority, 1615 N. St. Mary's, San Antonio, TX 78215.

At this meeting, the following business may be considered and recommended for Joint Planning Committee action:

1. Call to Order.
2. Designation of meeting Secretary.
3. Public Comment.
4. Receipt of Posted Notices.
5. Approval of April 19, 2010 Minutes.
6. Discussion and possible action related to establishing standard terminology for the various stages of a specific DFC of GMA 10.
7. Presentation, discussion and possible action concerning the Initially Prepared Plans of the regional water planning groups for Regions K and L, with respect to identified needs and responsive water management strategies.
8. Discussion and possible action related to establishing a Preliminary DFC for the Edwards Aquifer in the Northern Subdivision of GMA-10.
9. Discussion and possible action related to the designation of relevant aquifers for DFCs related to the Trinity Group, relevant aquifer assessments, and a schedule for the establishment of Trinity DFCs.
10. Discussion and possible action related to the designation of relevant aquifers for DFCs related to the Saline Edwards, relevant aquifer assessments, and a schedule for the establishment of Saline Edwards DFC(s).
11. Discussion and possible action related to the adoption of the DFC for the Leona Gravel and Related Aquifers in Medina County.
12. Discussion and possible action related to establishing a Preliminary DFC for the Leona Gravel and Related Aquifers in Uvalde County.
13. Discussion and possible action related to designating and establishing Preliminary DFC(s) for the relevant aquifers in the Western Subdivision of GMA-10 and in Kinney County.
14. Discussion and possible action concerning the schedule and location of upcoming public hearings on Preliminary Recommended DFCs that are planned by member GCDs.
15. Next Meeting and Discussion Topics.
16. Adjournment

Edwards Aquifer Authority

Phone (210) 222-2204

Fax (210) 222-2204
 District Clerk
 Kinney County, Texas

No. _____
 Filed on 5 day of May 20 10
 At 10:00 o'clock AM
 By Dana Eva Dandrea
 Deputy

SIGN-IN SHEET

Groundwater Management Area 10

May 17, 2010

NAME	REPRESENTING	PHONE	EMAIL
Rick Illgner	EAA	210 222 2204	rillgner@edwardsaquifer.org
KIRK HOLLAND	BSEAED	512-282-8441	kholland@bsead.org
DAVID BAKER	HTGCD	512-722-3390	Jacobswellspring@gmail.com
Stacy Metcalf	KCGCD	832-563-9943	
GEORGE WISSMANA	TORGCO	210-698-1155	
Vic Hildebrand	Hualde Co UWC D		
Luana Buchner	EAA		
Tommy Beehne	Medina Co GCD		
Daniel Meyer	PCCCD	512-398-2883	daniel.meyer@pccd.org
Sarah Backhouse	TWDS	512-436-2387	sarah.backhouse@twds.org
Bill Hutchins	TWDS		bill.hutchins@twds.state.tx.us

**GMA-10 Joint Planning Committee
Meeting Minutes
May 17, 2010**

1. **Call to Order.** The meeting was called to order by Committee Coordinator Rick Illgner at 11:30 am.
2. **Designation of meeting Secretary.** Rick Illgner agreed to be the Secretary for the meeting.
3. **Public Comment.** There was no public comment.
4. **Receipt of Posted Notices.** A quorum of eight of the nine GMA-10 GCDs were present: Barton Springs/Edwards Aquifer Conservation District (BSEACD), Plum Creek GCD (PCGCD), Edwards Aquifer Authority (EAA), Medina Co. GCD (MCGCD), Uvalde Co. UWCD (UCUWCD), Hays Trinity GCD, Trinity Glen Rose GCD and Kinney County GCD (KCGCD); Guadalupe County GCD was not present. Posted meeting notices were received from all nine of the GCDs, including Guadalupe County GCD.
5. **Approval of April 19, 2010, Minutes.** Luana Buckner (Medina Co. GCD) moved and Kirk Holland (BSEACD) seconded approving the April 19, 2010, minutes as presented. There were no objections; therefore minutes were approved.
6. **Discussion and possible action related to establishing standard terminology for the various stages of a specific DFC of GMA 10.** Kirk Holland reviewed the DFC adoption flow chart that was discussed at the April 19, 2010 meeting specifically for the purpose of developing standard terminology during the process as follows:
 - A Trial DFC – for GCD board consideration
 - B Preliminary DFC – set by GCD board for public input
 - C Recommended DFC – recommended by the GCD board to the GMA
 - D Proposed DFC – approved by the GMA for “preliminary final MAG”
 - E Adopted DFC – final GMA-approved DFC

Bill Hutchison commented that each of the steps may not be required in all situations and provided a few examples.

Bill Hutchison summarized a TWDB MEMO dated May 12, 2010, regarding consideration of exempt use in the DFC process. Generally, the TWDB will convert a DFC into a “total pumping” number that will be presented to the TWDB board on May 20, 2010.

7. **Discussion and possible action concerning the Initially Prepared Plans of the regional water planning groups for Regions K and L, with respect to identified needs and responsive water management strategies.** Regional water planning PowerPoint presentations were made by Steve Raabe (San Antonio River Authority) and Jennifer Walker made presentations on demands and water management strategies that effect groundwater use for Region L and Region K respectively

8. **Discussion and possible action related to establishing a Preliminary DFC for the Edwards Aquifer in the Northern Subdivision of GMA-10.** Kirk Holland discussed the development of DFCs by the BSEACD. The BSEACD is using springflow discharge at Barton springs as the DFC measure and is considering a range of 5 – 10 cfs for the drought of record (DOR). Modeling indicates that current pumping is approximately 11 cfs and with drought restrictions in place would provide about 5 cfs during a repeat of the DOR and 5 cfs may not pass the “Jeopardy” test with the U S Fish & Wildlife Service for the Habitat Conservation Plan that is under development. A DFC of 10 cfs would basically cut off all pumping during a DOR. Kirk anticipates a DFC between 5 and 10 cfs that could present management challenges to the district at low flows.

The BSEACD is considering an upper cap of 14 – 20 cfs that would be a function of water in storage in the aquifer to limit the total pumping amount which will be problematic during a drought. The BSEACD will hold a hearing on May 27.

Kirk Holland asked the TWDB for input on having two DFCs. Bill Hutchison responded that the DFC for water in storage is an important consideration and, while it is possible to have two DFCs, it is important that they do not conflict with one another. As an example, selecting an upper DFC of 20 cfs would probably be inconsistent with a 10 cfs DFC for the DOR. Therefore, BSEACD might consider expressing a DFC as an average springflow and a minimum springflow during the DOR. Kirk said he would get with the TWDB after the GMA 10 meeting to discuss the matter further.

9. **Discussion and possible action related to the designation of relevant aquifers for DFCs related to the Trinity Group, relevant aquifer assessments, and a schedule for the establishment of Trinity DFCs.** The BSEACD has worked with the Hays – Trinity GCD and would like DFCs for the upper, middle and lower Trinity and there might be parts of GMA 10 where the GMAM 10 boundaries are well-defined. It was mentioned that having a map of the areas where there is Trinity within GMA 10 would be helpful and the TWDB indicated they would try to have one for the next meeting. There is recognition that the DFC decisions of GMA 9 will affect the Trinity in GMA 10; therefore, it is a good idea to wait for the aquifer assessment to make decisions.
10. **Discussion and possible action related to the designation of relevant aquifers for DFCs related to the Saline Edwards, relevant aquifer assessments, and a schedule for the establishment of Saline Edwards DFC(s).** Kirk Holland said the BSEACD does not know a lot about the saline zone in the Edwards and is waiting on the TWDB on some information. The Bill Hutchison and Kirk Holland discussed DFC and assessment options.

- 11. Discussion and possible action related to the adoption of the DFC for the Leona Gravel and Related Aquifers in Medina County.** Luana Buckner indicated that the Medina County GCD asked the TWDB to perform an aquifer assessment of the Leona Gravel in Medina County '*GTA Aquifer Assessment 09-01*'. In the assessment, declines of 15', 25' and 35' over a 50-year period were considered. After consideration, the Medina County GCD selected a 15' decline which yields a MAG of 22,110 acre-feet. Motion was made by Tommy Boehme and seconded by Luana Buckner that GMA 10 adopts a Desired Future Condition for the Leona Gravel in Medina County of 15' in 50 years. The motion passed unanimously.
- 12. Discussion and possible action related to the adoption of the DFC for the Leona Gravel and Related Aquifers in Uvalde County.** Vic Hilderbran stated that the Uvalde County aquifer assessment is not complete, but should be finished soon. Although no decisions for a DFC have been made, the district has decided to use the J-27 monitoring well as a DFC measuring index. Public hearings will be scheduled after the district receives the completed aquifer assessment and then the board will take a vote a few days later and he expects to have a recommendation for GMA 10 within a month.
- 13. Discussion and possible action related to designating and establishing Preliminary DFC(s) for the relevant aquifers in the Western Subdivision of GMA-10 and in Kinney County.** The TWDB made a presentation to the Kinney County GCD on May 13 on an aquifer assessment and is continuing to work with the district. A work shop is scheduled for June 4 at which a DFC decision could be made.
- 14. Discussion and possible action concerning the schedule and location of upcoming public hearings on Preliminary Recommended DFCs that are planned by member GCDs.** Kirk Holland reiterated that BSEACD will be holding a hearing on May 27. Luana Buckner indicated the Medina County GCD should have something on the Trinity by the next GMA 10 meeting.
- 15. Next Meeting and Discussion Topics.** The next meeting will be on Monday, June 14 from 11:30-2:00 at the EAA Conference Center. The agenda will be distributed two weeks in advance (May 31) and that each GCD send the EAA a copy of their posted notice one week before the meeting (June 7) to avoid posting problems.
- 16. Adjournment.** The meeting was adjourned at approximately 2:20 pm.

RESOLUTION No. 2010-01
RESOLUTION FOR RATIFICATION OF THE ADOPTION OF THE DESIRED
FUTURE CONDITION OF THE LEONA GRAVEL AQUIFER IN MEDINA
COUNTY WITHIN GROUNDWATER MANAGEMENT AREA 10

WHEREAS; GROUNDWATER MANAGEMENT AREA (GMA) 10 IS COMPRISED OF DELEGATES FROM THE FOLLOWING GROUNDWATER CONSERVATION DISTRICTS LOCATED WHOLLY OR PARTIALLY WITHIN GMA 10: BARTON SPRINGS EDWARDS AQUIFER CONSERVATION DISTRICT, EDWARDS AQUIFER AUTHORITY, GUADALUPE COUNTY GCD, HAYS TRINITY GCD, KINNEY COUNTY GCD, MEDINA COUNTY GCD, PLUM CREEK CD, TRINITY GLEN ROSE GCD, AND UVALDE COUNTY UWCD;

WHEREAS; CHAPTER 36.108 OF THE TEXAS WATER CODE, (JOINT PLANNING IN MANAGEMENT AREA), REQUIRES THAT THE GROUNDWATER CONSERVATION DISTRICTS IN THE GMA ADOPT DESIRED FUTURE CONDITIONS OF ALL RELEVANT AQUIFERS IN THE GMA FOR A FIFTY YEAR HORIZON, NO LATER THAN SEPTEMBER 1,2010;

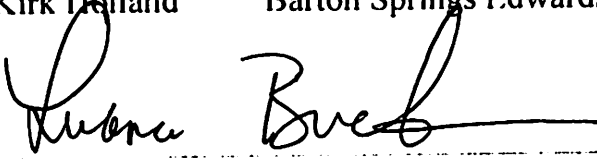
WHEREAS; THE COMMITTEE MEMBERS OF GMA 10 HAVE HELD PUBLIC MEETINGS NOTICED AND POSTED IN ACCORDANCE WITH STATE LAW, AND HAVE REVIEWED AND DISCUSSED GROUNDWATER AVAILABILITY MODEL (GAM) RUNS WITH INPUT AND COMMENT FROM STAKEHOLDERS WITHIN GMA 10;

WHEREAS; IN REFERENCE TO GAM RUN "*GTA AQUIFER ASSESSMENT 09-01*", THE COMMITTEE CONSIDERED SCENARIOS WITH AVERAGE DRAWDOWNS OF 15 FEET, 25 FEET, AND 35 FEET OVER THE NEXT 50 YEARS;

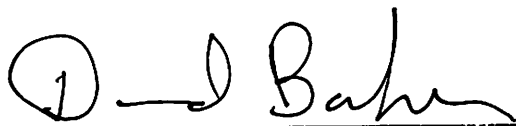
NOW, THEREFORE, BE IT RESOLVED THAT, ON MAY 17, 2010, THE DISTRICT MEMBERS OF GROUNDWATER MANAGEMENT AREA 10 ADOPTED THE SCENARIO WITH AN AVERAGE DRAWDOWN OF 15 FT AS THE DESIRED FUTURE CONDITION OF THE LEONA GRAVEL AQUIFER IN MEDINA COUNTY, AND THAT SUCH ADOPTION IS HEREBY RATIFIED;

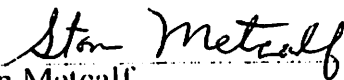
AND IT IS SO ORDERED AND PASSED THIS 19TH DAY OF JULY 2010.

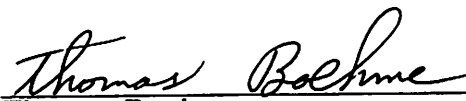
SIGNED 
Kirk Holland Barton Springs Edwards Aquifer Conservation District

SIGNED 
Luana Buckner Edwards Aquifer Authority

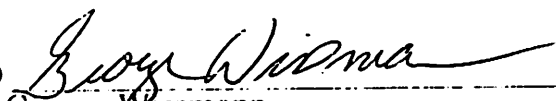
SIGNED _____
Ron Nauman Guadalupe County GCD

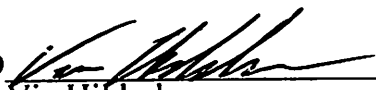
SIGNED 
David Baker Hays Trinity GCD

SIGNED 
Stan Metcalf Kinney County GCD

SIGNED 
Thomas Boehme Medina County GCD

SIGNED 
Daniel Meyer Plum Creek Conservation District

SIGNED 
George Wissmann Trinity Glen Rose GCD

SIGNED 
Vic Hilderbran Uvalde County UWCD

GTA Aquifer Assessment 09-01

by Peter G. George, Ph.D., P.G.

Texas Water Development Board
Groundwater Technical Assistance Section
(512) 475-2136

January 25, 2009

REQUESTOR:

Rick Illgner, on behalf of Groundwater Management Area 10.

DESCRIPTION OF REQUEST:

In an email dated 3/13/2009, Mr. Rick Illgner, administrator for GMA 10, requested the Texas Water Development Board (TWDB) to prepare a draft Managed Available Groundwater (MAG) for the Leona Gravel Aquifer in Medina County utilizing any and all TWDB data and information from the October 2002 Phase I Leona Gravel Aquifer Study (Lowry and Couch, 2002), water level data, and current pumping data provided by the Medina County Groundwater Conservation District. The draft MAG is to be based upon the Desired Future Condition.

DESIRED FUTURE CONDITIONS:

Allow average water-level declines in the Leona Gravel Aquifer of 15, 25, and 35 feet over the next 50 years.

METHODS:

A transient hydrologic budget for the saturated portion of an aquifer is described by Freeze and Cherry (1979, p.365):

$$Q(t) = R(t) - D(t) + \frac{dS}{dt}$$

where $Q(t)$ = total rate of groundwater withdrawal
 $R(t)$ = total rate of groundwater recharge to the basin
 $D(t)$ = total rate of groundwater discharge from the basin
 $\frac{dS}{dt}$ = rate of change of storage in the saturated zone of the basin

For this analysis, it is assumed that

$$R(t) = R(r) + R(e)$$

where $R(r)$ = rejected recharge for the basin
 $R(e)$ = effective recharge

Effective recharge is the amount of water that enters an aquifer and is available for development (Muller and Price, 1979, p. 5). Rejected recharge is the amount of total (or potential) recharge that discharges from an aquifer because it is over-full and cannot accept more water (Theis, 1940, p.1).

In addition, it is assumed that

$$R(r) \cong D(t)$$

Therefore, the total rate of groundwater withdrawal equals effective recharge plus the change in storage of the aquifer, or

$$Q(t) = R(e) + \frac{dS}{dt}$$

Using ArcGIS 9.2, the boundary of the Leona Gravel Aquifer was determined using the Digital Geologic Atlas of Texas (USGS and TWDB, 2006). The aquifer was divided into three units (Figure 1); unit 1 is the Leona Formation (Qle), unit 2 includes Quaternary Alluvium (Qal), and unit 3 is terrace deposits (Qt). These units were further subdivided by GMA and river basin boundaries. Map areas were calculated for each subdivision (Figure 2).

The average annual precipitation (1971-2000) for each aquifer outcrop map unit (Qle, Qt, and Qal) was determined from the Texas Climatic Atlas (Narasimhan and others, 2008) using zonal statistics in Spatial Analyst (ArcGIS 9.2). The average annual precipitation values were used to calculate annual effective recharge volumes (Table 1).

To determine the annual volume from storage used, the areas were multiplied by the estimated aquifer specific yield, and then by annual drawdown of 0.3, 0.5, and 0.7 feet.

All calculations were done in a Microsoft Excel worksheet (Tables 2 and 3).

PARAMETERS AND ASSUMPTIONS:

- The Leona Gravel Aquifer in Medina County consists of three units; unit 1 is the Leona Formation (Qle), unit 2 includes fluvial terrace deposits (Qt), and unit 3 is Quaternary Alluvium (Qal).
- Areas in acres for each unit of the aquifer, after being subdivided by GMA and river basin boundaries, were calculated in ArcGIS 9.2 using the 1:250,000 Digital Geological Atlas of Texas (USGS and TWDB, 2006).
- Annual water level declines of 0.3, 0.5, and 0.7 feet were estimated to be uniform across the aquifer.
- Average annual precipitation was used to calculate effective recharge volumes.
- The average annual precipitation for the aquifer area, based on the period of 1971 to 2000, was determined from the Texas Climatic Atlas (Narasimhan and others, 2008).

- Recharge from precipitation is estimated to be 5.5 percent of annual precipitation (Mace and others, 2000; Lowry and Couch, 2002).
- Well reports submitted to the TWDB by drillers from 2003 to 2009 indicate a mean thickness for Leona Gravel Aquifer of about 60 feet.
- Well reports submitted to the TWDB by drillers from 2001 to 2009 indicate a mean thickness for sand and gravel deposits in the aquifer of about 22 feet, with the remainder being mostly clay, or clay with silt and sand.
- Specific yield of the aquifer is estimated to be 0.15 (Johnson, 1967).
- Discharge from the Leona Gravel Aquifer to streams is assumed to be about 15,000 AFY.
- The draft managed available groundwater volume estimates are the sum of the annual effective recharge amount and the annual volume of water depleted from the aquifer based on the draft desired future condition.
- Annual volumes of groundwater taken from storage are calculated by dividing the total volume of depletion, based on the desired future condition, by 50 years.
- Conditions were assumed to be physically possible in the area of interest. It is assumed that water level declines do not exceed aquifer thickness.

RESULTS:

The annual effective recharge estimate for the Leona Gravel Aquifer in Medina County is 27,607 acre-feet per year (Table 1).

The results (Tables 2 through 7) show the draft managed available groundwater estimates for the Leona Gravel Aquifer in Medina County. A 15-foot decline over 50 years results in an estimated annual total volume of 22,110 acre-feet per year. A 25-foot decline over 50 years results in an estimated annual total volume of 28,445 acre-feet per year. A 35-foot decline over 50 years results in an estimated annual total volume of 34,780 acre-feet per year.

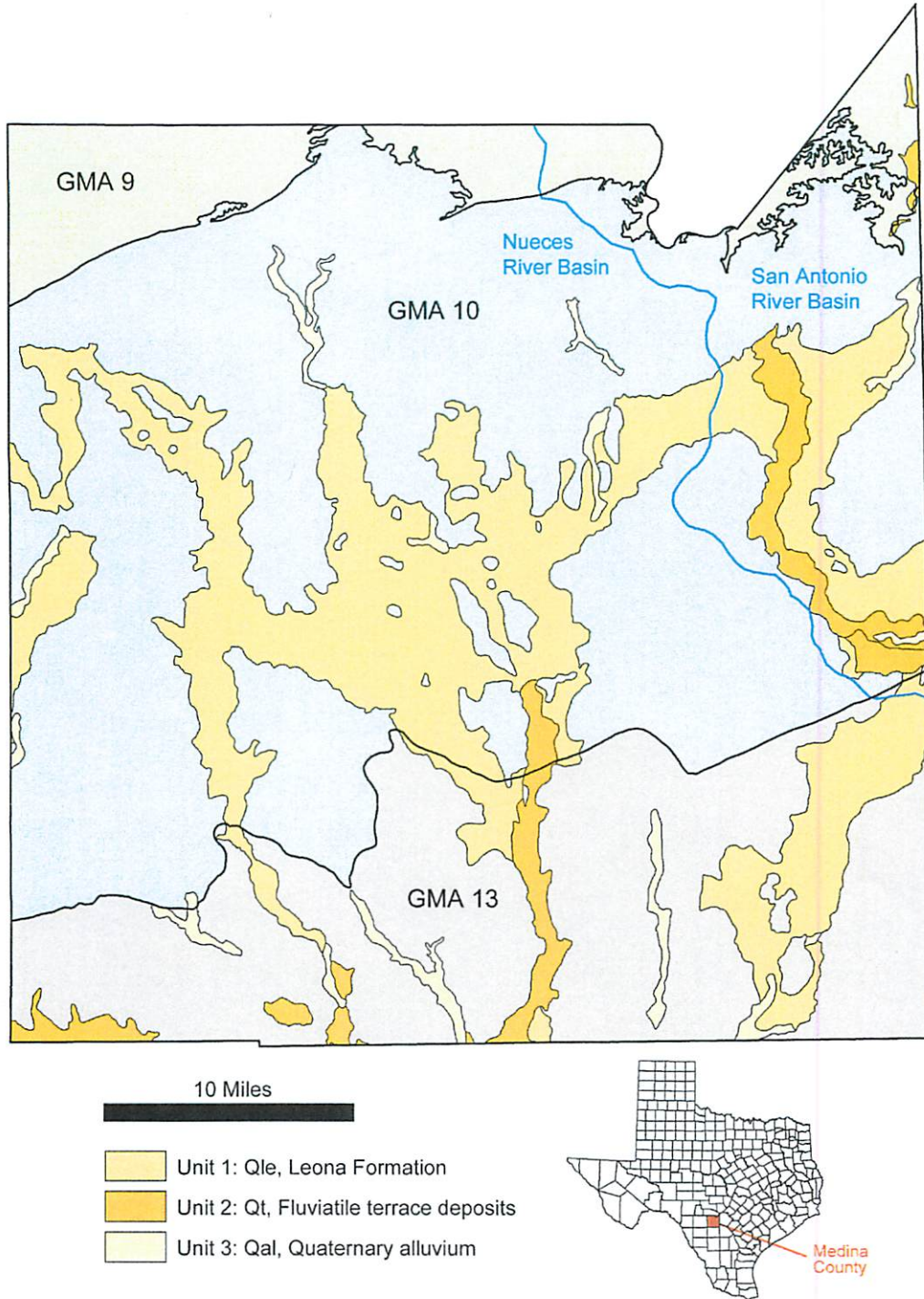


Figure 1. Partial geology of Medina County showing GMA and river basin boundaries.

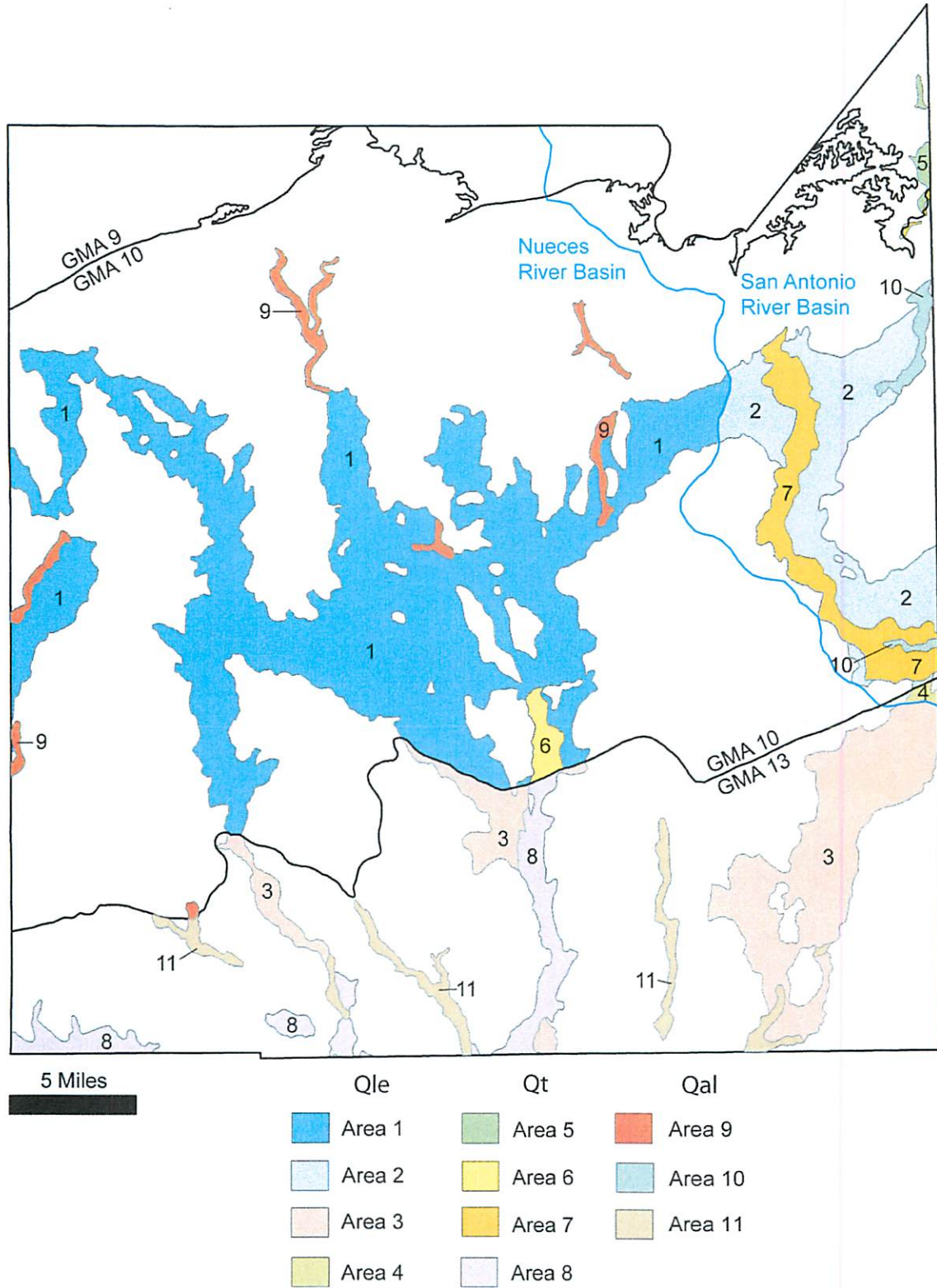


Figure 2. Map areas based on geology, GMA boundaries, and river basins.

GTA Aquifer Assessment 09-01mag
 Groundwater Management Area 10
 Leona Gravel Aquifer
 Managed Available Groundwater estimates
 January 25, 2009

Table 1. Estimated total annual recharge volume for the Leona Gravel Aquifer by map area subdivisions (See Figure 2).

GMA	Geologic Unit	County	GCD	River Basin	Map Area	Areal extent (acres)	Average precipitation (inches)	Average precipitation (feet)	Effective recharge rate (percent)	Estimated annual effective recharge (acre-feet)
9	Qle: Leona Fm	Medina	Medina County GCD	N/A	N/A	0	28.55	2.38	5.5	0
10	Qle: Leona Fm	Medina	Medina County GCD	Nueces	1	109896	28.55	2.38	5.5	14,385
10	Qle: Leona Fm	Medina	Medina County GCD	San Antonio	2	24203	28.55	2.38	5.5	3,168
13	Qle: Leona Fm	Medina	Medina County GCD	Nueces	3	34,191	28.55	2.38	5.5	4,476
13	Qle: Leona Fm	Medina	Medina County GCD	San Antonio	4	471	28.55	2.38	5.5	62
9	Qt: Fluvialite terrace deposits	Medina	Medina County GCD	San Antonio	5	882	28.72	2.39	5.5	116
10	Qt: Fluvialite terrace deposits	Medina	Medina County GCD	Nueces	6	2,124	28.72	2.39	5.5	279
10	Qt: Fluvialite terrace deposits	Medina	Medina County GCD	San Antonio	7	12,061	28.72	2.39	5.5	1,585
13	Qt: Fluvialite terrace deposits	Medina	Medina County GCD	Nueces	8	11,869	28.72	2.39	5.5	1,560
9	Qal: Alluvium	Medina	Medina County GCD	N/A	N/A	0	27.81	2.32	5.5	0
10	Qal: Alluvium	Medina	Medina County GCD	Nueces	9	6,102	27.81	2.32	5.5	779
10	Qal: Alluvium	Medina	Medina County GCD	San Antonio	10	2,010	27.81	2.32	5.5	256
13	Qal: Alluvium	Medina	Medina County GCD	Nueces	11	7,369	27.81	2.32	5.5	940
Total:										27,607

Table 2. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by map area subdivisions, based on an annual drawdown of 0.3 feet for 50 years, 15 feet total (see Figure 1).

Geologic Unit	Map Area	GMA	River Basin	Areal extent (acres)	Year	Specific Yield	Annual Drawdown (feet)	Estimated annual volume from storage (acre-feet)	Estimated annual effective recharge (acre-feet)	Estimated annual discharge to streams (acre-feet)	Estimated annual total volume (acre-feet)*
Qle: Leona Fm	N/A	9	N/A	0	2010	0.15	0.3	0	0	0	0
Qle: Leona Fm	1	10	Nueces	109,896	2010	0.15	0.3	4,945	14,385	7,806	11,525
Qle: Leona Fm	2	10	San Antonio	24,203	2010	0.15	0.3	1,089	3,168	1,719	2,538
Qle: Leona Fm	3	13	Nueces	34,191	2010	0.15	0.3	1,539	4,476	2,429	3,586
Qle: Leona Fm	4	13	San Antonio	471	2010	0.15	0.3	21	62	33	49
Qt: Fluvial terrace deposits	5	9	San Antonio	882	2010	0.15	0.3	40	116	63	93
Qt: Fluvial terrace deposits	6	10	Nueces	2,124	2010	0.15	0.3	96	279	151	224
Qt: Fluvial terrace deposits	7	10	San Antonio	12,061	2010	0.15	0.3	543	1,585	857	1,271
Qt: Fluvial terrace deposits	8	13	Nueces	11,869	2010	0.15	0.3	534	1,560	843	1,251
Qal: Alluvium	N/A	9	N/A	0	2010	0.15	0.3	0	0	0	0
Qal: Alluvium	9	10	Nueces	6,102	2010	0.15	0.3	275	779	433	620
Qal: Alluvium	10	10	San Antonio	2,010	2010	0.15	0.3	90	256	143	204
Qal: Alluvium	11	13	Nueces	7,369	2010	0.15	0.3	332	940	523	749
								9,503	27,607	15,000	22,110
* Managed Available Groundwater (MAG)								475,148	1,380,338	750,000	1,105,486

The estimated total annual effective recharge volume for the Leona Gravel Aquifer by map areas is from Table 1. The formulas for this table are: specific yield * areal extent * annual drawdown = estimated annual volume from storage. The estimated annual volume from storage + estimated annual effective recharge – estimated annual discharge to streams = estimated annual total volume.

Table 3. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by GMA for an annual drawdown of 0.3 feet, 15 feet total (see Figure 1).

GMA	River Basin	Geologic Unit	Estimated annual effective recharge (acre-feet)	Estimated annual volume from storage (acre-feet)	Estimated annual discharge to streams (acre-feet)	MAG Estimated annual total volume (acre-feet)*
9	San Antonio	Qt: Fluvialite terrace deposits	116	40	63	93
		Unit Totals:	116	40	63	93
10	Nueces	Qle: Leona Fm	14,385	4,945	7,806	11,525
10	San Antonio	Qle: Leona Fm	3,168	1,089	1,719	2,538
10	Nueces	Qt: Fluvialite terrace deposits	279	96	151	224
10	San Antonio	Qt: Fluvialite terrace deposits	1,585	543	857	1,271
10	Nueces	Qal: Alluvium	779	275	433	620
10	San Antonio	Qal: Alluvium	256	90	143	204
		Unit Totals:	20,453	7,038	11,109	16,382
13	Nueces	Qle: Leona Fm	4,476	1,539	2,429	3,586
13	San Antonio	Qle: Leona Fm	62	21	33	49
13	Nueces	Qt: Fluvialite terrace deposits	1,560	534	843	1,251
13	Nueces	Qal: Alluvium	940	332	523	749
		Unit Totals:	7,038	2,426	3,829	5,635
		Total (All Units):	27,607	9,503	15,000	22,110

Table 4. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by map area subdivisions, based on an annual drawdown of 0.5 feet over 50 years, 25 feet total (see Figure 1).

Geologic Unit	Map Area	GMA	River Basin	Areal extent (acres)	Year	Specific Yield	Annual Drawdown (feet)	Estimated annual volume from storage (acre-feet)	Estimated annual effective recharge (acre-feet)	Estimated annual discharge to streams (acre-feet)	Estimated annual total volume (acre-feet)*
Q1e: Leona Fm	N/A	9	N/A	0	2010	0.15	0.5	0	0	0	0
Q1e: Leona Fm	1	10	Nueces	109,896	2010	0.15	0.5	8,242	14,385	7,806	14,822
Q1e: Leona Fm	2	10	San Antonio	24,203	2010	0.15	0.5	1,815	3,168	1,719	3,264
Q1e: Leona Fm	3	13	Nueces	34,191	2010	0.15	0.5	2,564	4,476	2,429	4,611
Q1e: Leona Fm	4	13	San Antonio	471	2010	0.15	0.5	35	62	33	64
Qt: Fluvialite terrace deposits	5	9	San Antonio	882	2010	0.15	0.5	66	116	63	119
Qt: Fluvialite terrace deposits	6	10	Nueces	2,124	2010	0.15	0.5	159	279	151	288
Qt: Fluvialite terrace deposits	7	10	San Antonio	12,061	2010	0.15	0.5	905	1,585	857	1,633
Qt: Fluvialite terrace deposits	8	13	Nueces	11,869	2010	0.15	0.5	890	1,560	843	1,607
Qa1: Alluvium	N/A	9	N/A	0	2010	0.15	0.5	0	0	0	0
Qa1: Alluvium	9	10	Nueces	6,102	2010	0.15	0.5	458	779	433	803
Qa1: Alluvium	10	10	San Antonio	2,010	2010	0.15	0.5	151	256	143	264
Qa1: Alluvium	11	13	Nueces	7,369	2010	0.15	0.5	553	940	523	970
								15,838	27,607	15,000	28,445
								(2011 to 2060: same numbers each year)			
* Managed Available Groundwater (MAG)				50 year period totals:			791,913	1,380,338	750,000	1,422,251	

The estimated total annual effective recharge volume for the Leona Gravel Aquifer by map areas is from Table 1. The formulas for this table are: specific yield * areal extent * annual drawdown = estimated annual volume from storage. The estimated annual volume from storage + estimated annual effective recharge – estimated annual discharge to streams = estimated annual total volume.

GTA Aquifer Assessment 09-01mag
 Groundwater Management Area 10
 Leona Gravel Aquifer
 Managed Available Groundwater estimates
 January 25, 2009

Table 5. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by GMA for an annual drawdown of 0.5 feet, 25 feet total (see Figure 1).

GMA	River Basin	Geologic Unit	Estimated annual effective recharge (acre-feet)	Estimated annual volume from storage (acre-feet)	Estimated annual discharge to streams (acre-feet)	MAG Estimated annual total volume (acre-feet)*
9	San Antonio	Qt: Fluvialite terrace deposits	116	66	63	119
		Unit Totals:	116	66	63	119
10	Nueces	Qle: Leona Fm	14,385	8,242	7,806	14,822
10	San Antonio	Qle: Leona Fm	3,168	1,815	1,719	3,264
10	Nueces	Qt: Fluvialite terrace deposits	279	159	151	288
10	San Antonio	Qt: Fluvialite terrace deposits	1,585	905	857	1,633
10	Nueces	Qal: Alluvium	779	458	433	803
10	San Antonio	Qal: Alluvium	256	151	143	264
		Unit Totals:	20,453	11,730	11,109	21,074
13	Nueces	Qle: Leona Fm	4,476	2,564	2,429	4,611
13	San Antonio	Qle: Leona Fm	62	35	33	64
13	Nueces	Qt: Fluvialite terrace deposits	1,560	890	843	1,607
13	Nueces	Qal: Alluvium	940	553	523	970
		Unit Totals:	7,038	4,043	3,829	7,252
		Total (All Units):	27,607	15,838	15,000	28,445

GTA Aquifer Assessment 09-01mag
 Groundwater Management Area 10
 Leona Gravel Aquifer
 Managed Available Groundwater estimates
 January 25, 2009

Table 6. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by map area subdivisions, based on an annual drawdown of 0.7 feet over 50 years, 35 feet total (see Figure 1).

Geologic Unit	Map Area	GMA	River Basin	Areal extent (acres)	Year	Specific Yield	Annual Drawdown (feet)	Estimated annual volume from storage (acre-feet)	Estimated annual effective recharge (acre-feet)	Estimated annual discharge to streams (acre-feet)	Estimated annual total volume (acre-feet)*
Qle: Leona Fm	N/A	9	N/A	0	2010	0.15	0.7	0	0	0	0
Qle: Leona Fm	1	10	Nueces	109,896	2010	0.15	0.7	11,539	14,385	7,806	18,118
Qle: Leona Fm	2	10	San Antonio	24,203	2010	0.15	0.7	2,541	3,168	1,719	3,990
Qle: Leona Fm	3	13	Nueces	34,191	2010	0.15	0.7	3,590	4,476	2,429	5,637
Qle: Leona Fm	4	13	San Antonio	471	2010	0.15	0.7	49	62	33	78
Qt: Fluvial terrace deposits	5	9	San Antonio	882	2010	0.15	0.7	93	116	63	146
Qt: Fluvial terrace deposits	6	10	Nueces	2,124	2010	0.15	0.7	223	279	151	351
Qt: Fluvial terrace deposits	7	10	San Antonio	12,061	2010	0.15	0.7	1,266	1,585	857	1,995
Qt: Fluvial terrace deposits	8	13	Nueces	11,869	2010	0.15	0.7	1,246	1,560	843	1,963
Qal: Alluvium	N/A	9	N/A	0	2010	0.15	0.7	0	0	0	0
Qal: Alluvium	9	10	Nueces	6,102	2010	0.15	0.7	641	779	433	986
Qal: Alluvium	10	10	San Antonio	2,010	2010	0.15	0.7	211	256	143	325
Qal: Alluvium	11	13	Nueces	7,369	2010	0.15	0.7	774	940	523	1,191
								22,174	27,607	15,000	34,780
(2011 to 2060: same numbers each year)											
* Managed Available Groundwater (MAG)											
50 year period totals:								1,108,678	1,380,338	750,000	1,739,016

The estimated total annual effective recharge volume for the Leona Gravel Aquifer by map areas is from Table 1. The formulas for this table are: specific yield * areal extent * annual drawdown = estimated annual volume from storage. The estimated annual volume from storage + estimated annual effective recharge – estimated annual discharge to streams = estimated annual total volume.

Table 7. Estimates of draft managed available groundwater for the Leona Gravel Aquifer by GMA for an annual drawdown of 0.7 feet, 35 feet total (see Figure 1).

GMA	River Basin	Geologic Unit	Estimated annual effective recharge (acre-feet)	Estimated annual volume from storage (acre-feet)	Estimated annual discharge to streams (acre-feet)	MAG Estimated annual total volume (acre-feet)*
9	San Antonio	Qt: Fluvialite terrace deposits	116	93	63	146
		Unit Totals:	116	93	63	146
10	Nueces	Qle: Leona Fm	14,385	11,539	7,806	18,118
10	San Antonio	Qle: Leona Fm	3,168	2,541	1,719	3,990
10	Nueces	Qt: Fluvialite terrace deposits	279	223	151	351
10	San Antonio	Qt: Fluvialite terrace deposits	1,585	1,266	857	1,995
10	Nueces	Qal: Alluvium	779	641	433	986
10	San Antonio	Qal: Alluvium	256	211	143	325
		Unit Totals:	20,453	16,421	11,109	25,766
13	Nueces	Qle: Leona Fm	4,476	3,590	2,429	5,637
13	San Antonio	Qle: Leona Fm	62	49	33	78
13	Nueces	Qt: Fluvialite terrace deposits	1,560	1,246	843	1,963
13	Nueces	Qal: Alluvium	940	774	523	1,191
		Unit Totals:	7,038	5,660	3,829	8,869
		Total (All Units):	27,607	22,174	15,000	34,780

LIMITATIONS:

Additional data are needed to create improved estimates; these estimates are a basic interpretation of the requested conditions. This analysis assumes homogeneous and isotropic aquifers; however, conditions for the Leona Gravel Aquifer may not behave in a uniform manner. There is uncertainty with respect to the distribution of the sand and gravel in the aquifer (Lowry and Couch, 2002; Green, 2003). The analysis further assumes that precipitation is the only source of aquifer recharge and that lateral inflow to the aquifer is equal to lateral outflow from the aquifer, and that future pumping will not alter this balance.

Discharge and recharge from other aquifers, such as the Edwards BFZ aquifer, are unknown as is recharge from streams. Discharge to streams from the Leona Gravel Aquifer is assumed to be 15,000 acre-feet per year, but this number needs to be investigated with gain-loss streamflow assessment research. The recharge rate is also a rough estimate as is the specific yield.

Note that estimates of managed available groundwater are based on the best available scientific tools that can be used to develop managed available groundwater and that these estimates can be a function of assumptions made on the magnitude and distribution of pumping in the aquifer. Therefore, it is important for groundwater conservation districts to monitor whether or not they are achieving their desired future conditions and to work with the TWDB to refine managed available groundwater given the reality of how the aquifer responds to the actual magnitude and distribution of pumping now and in the future.

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