

LONE STAR GROUNDWATER CONSERVATION DISTRICT

February 12, 2019

MINUTES OF SPECIAL MEETING

The Board of Directors of the Lone Star Groundwater Conservation District (“District”) held a “Special Meeting,” open to the public, in the Lone Star GCD – James B. “Jim” Wesley Board Room located at 655 Conroe Park North Drive, Conroe, Texas, within the boundaries of the District on February 12, 2019.

President Melder called the meeting to order at 5:16 PM, announcing that it was now open to the public.

The roll was called of the members of the Board of Directors, to wit:

Jon Paul Bouché
Harry Hardman
Webb Melder
Jonathan Prykryl
Larry A. Rogers
Jim Spigener
Stuart Traylor

All members of the Board were present, thus constituting a quorum of the Board of Directors. Also, in attendance at said meeting were Kathy Turner Jones, District General Manager; Samantha Reiter, Assistant General Manager; Stacey V. Reese, District Counsel, District staff and members of the public. *Copies of the public sign-in sheets and comment cards received are attached hereto as Exhibit “A” to the Regular Board of Directors Meeting minutes.*

PLEDGES OF ALLEGIANCE AND PRAYER:

Director Rogers gave the opening prayer. Director Spigener led the United States Pledge of Allegiance and the Pledge of Allegiance to the State Flag - Texas.

After a proper and legally sufficient announcement to the public by President Melder, the Board of Directors went into a Closed Executive Session at 5:17 PM pursuant to Texas Government Code, Sections 551.071, to consult with the District’s attorney regarding pending or contemplated litigation, settlement offers, personnel matters, or on matters in which the duty of the attorney to the governmental body under the Texas Disciplinary Rules of Professional Conduct of the State Bar of Texas clearly conflicts with the Texas Open Meetings Act, Chapter 551, Government Code.

Following Executive Session, the Board reconvened in Open Session and President Melder declared it open to the public at 6:04 PM.

No additional action was taken on matters discussed in Executive Session and President Melder adjourned the meeting at 6:04 PM.

PASSED, APPROVED, AND ADOPTED THIS 12th DAY OF MARCH 2019.



Stuart Traylor, Board Secretary

LONE STAR GROUNDWATER CONSERVATION DISTRICT

February 12, 2019

MINUTES OF PUBLIC HEARING ON PERMIT APPLICATIONS

The Board of Directors of the Lone Star Groundwater Conservation District (“District”) met in regular session, open to the public, in the Lone Star GCD – James B. “Jim” Wesley Board Room located at 655 Conroe Park North Drive, Conroe, Texas, within the boundaries of the District on February 12, 2019.

CALL TO ORDER:

President Melder called to order the Public Hearing on Permit Applications at 6:04 PM announcing the meeting open to the public.

ROLL CALL:

The roll was called of the members of the Board of Directors, to wit:

Jon Paul Bouché
Harry Hardman
Webb Melder
Jonathan Prykryl
Larry A. Rogers
Jim Spigener
Stuart Traylor

All members of the Board were present with the exception of Director(s) Hardman, thus constituting a quorum of the Board of Directors. Also, in attendance at said meeting were Kathy Turner Jones, General Manager; Samantha Reiter, Assistant General Manager; Stacey V. Reese, District Counsel; District staff; and members of the public. *Copies of the public sign-in sheets and comment cards received are attached hereto as Exhibit “A” to the Regular Board of Directors Meeting minutes..*

Assistant General Manager, Samantha Reiter briefed the Board on permit applications received for the month. Applications for consideration and recommended for possible approval included the below:

1. Aqua Texas, Inc. (Woodland Ranch)

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 673,000 gallons for 2018 and annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to authorize **conditional** approval for that which is being requested. Approval of the requested permit amendment is **conditional** upon receipt of a letter of assurance from a certified Joint GRP. Aqua Texas, Inc. currently has an existing GRP contract with the SJRA GRP which includes their 24 other systems.

2. Montgomery County Hospital District – EMS 32

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 74,000 gallons for 2018 **only**. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

3. Tranquility Ranch Sand & Gravel

Applicant is requesting an amendment to an Operating Permit for drilling authorization only. No additional production authorization is being requested at this time. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

4. Shapla Enterprises

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 52,000 gallons for 2018 and 150,000 gallons for 2019 and annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

5. Montgomery ISD (Lake Creek High School)

Applicant is requesting an amendment to an Operating Permit to change the permitted water use type only. The permitted water use type will change from commercial use to irrigation use. No additional production authorization or wells are being requested at this time. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

6. DeanCo

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 75,000 gallons for 2019 and annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

7. Don E. Granger (Center)

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 150,000 gallons for 2018 and annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

8. Mena Francois (Moorehead Rd)

Applicant is requesting an amendment to an Operating Permit for an increase in production authorization in the amount of 160,000 gallons for 2018 **only**. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

9. Gulf Coast Stabilized Materials (Old Conroe Magnolia Rd)

Applicant is requesting the registration of a new well and production authorization in the amount of 2,500,000 gallons for 2019 and annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to approve that which is requested.

10. Montgomery County MUD #149

Applicant is requesting the registration of a new well and production authorization in the amount of 2,000,000 gallons for 2019 and 8,000,000 gallons annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to authorize **conditional** approval for that which is being requested. Approval of the request is contingent upon receipt of additional requested documentation.

11. Montgomery County MUD #164

Applicant is requesting the registration of a new well and production authorization in the amount of 2,000,000 gallons for 2019 and 6,500,000 gallons annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to authorize **conditional** approval for that which is being requested. Approval of the request is contingent upon receipt of additional requested documentation.

12. Montgomery County MUD #150

Applicant is requesting the registration of a new well and production authorization in the amount of 2,000,000 gallons for 2019 and 8,000,000 gallons annually thereafter. Based on technical review of the information supplied, it is the General Manager's recommendation to authorize **conditional** approval for that which is being requested. Approval of the request is contingent upon receipt of additional requested documentation.

Following Ms. Reiter's report, two different groups of permit applications and amendments were approved. Director Bouché motioned to approve items #2-9, as recommended by the General Manager. Director Hardman seconded. Motion approved.

Director Bouché motioned to approve conditional approval to items #1, 10, 11, and 12 as recommended by the General Manager. Director Spigener seconded. Motion approved.

President Melder adjourned the public hearing on permit applications at 6:07 PM.

PASSED, APPROVED, AND ADOPTED THIS 12th DAY OF MARCH 2019.


Stuart Traylor, Board Secretary

LONE STAR GROUNDWATER CONSERVATION DISTRICT

February 12, 2019

MINUTES OF REGULAR MEETING

The Board of Directors of the Lone Star Groundwater Conservation District (“District”) met in regular session, open to the public, in the Lone Star GCD - James B. “Jim” Wesley Board Room located at 655 Conroe Park North Drive, Conroe, Texas, within the boundaries of the District on February 12, 2019.

CALL TO ORDER:

President Melder presided and called to order the regular Board of Directors meeting at 6:07 PM, announcing that it was open to the public.

ROLL CALL:

The roll was called of the members of the Board of Directors, to wit:

Jon Paul Bouché
Harry Hardman
Webb Melder
Jonathan Prykryl
Larry A. Rogers
Jim Spigener
Stuart Traylor

All members of the Board were present, thus constituting a quorum of the Board of Directors. Also, in attendance at said meeting were Kathy Turner Jones, General Manager; Samantha Reiter, Assistant General Manager; Stacey V. Reese, District Counsel; District staff; and members of the public. *Copies of the public sign-in sheets and comment cards received are attached hereto as Exhibit "A".*

PUBLIC COMMENTS:

Mr. Mike Keester, hydrogeologist of LRE Water, LLC, while not present, sent a statement to the Board regarding recommendations for updating the HAGM. President Melder read from this statement, “ultimately the goal is to advance the science in a way that benefits all stakeholders.”

APPROVAL OF THE MINUTES:

President Melder stated the Board would consider the meeting minutes as listed for approval on today's agenda. Without further discussion, upon a motion by Director Rogers, seconded by Director Traylor, the board approved the meeting minutes as presented.

- a) January 22, 2019, Special Board of Directors Meeting
- b) January 30, 2019, Special Meeting with GMA 14 Joint Meeting

REVIEW OF UNAUDITED FINANCIALS FOR THE MONTH OF JANUARY 2019:

Ms. Kay Martin, bookkeeper, reported that for the month of January, revenue was \$205,056. January expenses were \$134,421. The budgeted net income, which was based on 2018 expenses, was \$40,926. Net income for the month was \$70,635.

- a) Update on draft 2019 Budget – Kathy Turner Jones

Ms. Jones reported that she and Samantha Reiter have been working with staff to review and make recommendations for the draft budget for fiscal year 2019 to begin discussions with Treasurer Spigener. This process requires in-depth review of the current and previous years budgets and analysis of the budget relationship with goals and management strategies identified by the Board, as well as forecasting future needs and expenses of the District.

PRESENTATION TEXAS 4-H AMBASSADOR PROGRAM:

Mr. David Smith gave a presentation explaining the development and future activities of the Texas 4-H Water Ambassadors program. The program provides high school students opportunities to explore career paths in the water industry. Through the program's Tiers I, II, and III academy students take advantage of an educational tour to various water facilities around the state to get hands-on experience. There is representation from 39 Texas counties. The ambassadors are expected to volunteer 40 hours of service to deliver water education at local 4-H clubs, schools, fairs and other community events. Applications must be submitted on-line at <https://fs4.formsite.com/state4h/water/index.html> by **May 15, 2019**.

- a) Discuss, consider, and take action as necessary to approve 2019 scholarship funding.

After some discussion, Director Traylor made a motion that a \$2,500 contribution be made to the 4-H Water Ambassadors Program. Director Spigener seconded. Motion carried with 4-3 vote. Nay votes were Directors Bouché, Prykryl and Rogers.

PRESENTATION TO RECEIVE AND TAKE ACTION TO PROCLAIM MARCH 10-16, 2019 AS "NATIONAL GROUNDWATER AWARENESS WEEK" IN MONTGOMERY COUNTY, STATE OF TEXAS. RESOLUTION #19-001:

Ms. Reiter explained the purpose of the proclamation was to acknowledge the "National Groundwater Awareness Week" as has been Lone Star's practice. In the past, this week has coincided with the school spring break; so, the Mobile Lab has made visits to preschools, libraries and the like.

After some discussion and two directors proposing amendments, a motion was made by Director Traylor that the resolution be accepted with amendments. Director Spigener seconded. The motion passed 6-1 with a nay vote from Director Bouché. *A copy of the amended, approved resolution is attached hereto as Exhibit "B".*

Director Traylor exits meeting at 6:46 PM.

Judge Mark Evans and Mr. Mike Turco were recognized as in attendance.

DISCUSS, CONSIDER, AND TAKE ACTION AS NECESSARY TO AUTHORIZE ADDITIONAL FUNDING REQUEST FROM RESOURCE ACTION PROGRAMS FOR EDUCATIONAL CURRICULUM; NOT TO EXCEED \$1,450:

Ms. Reiter explained that she received notification of a teacher requesting to participate in the District's sponsored water wise educational kit program. Unfortunately, there was not enough remaining kits to cover the requested number of students. Therefore, Ms. Reiter was requesting consideration for additional kit funding of \$1,450 to provide for the additional educational kits at the local school. Currently 15 schools and 1300 youth participate in the educational program in the county with over \$42,000 budgeted and spent for the 2018-2019 school year. After some discussion, a motion was made by Director Rogers to authorize the additional funding as requested, no second was made and the motion died.

PRESENTATION BY UNITED STATES GEOLOGICAL SURVEY (USGS) REGARDING GROUNDWATER STUDIES AND PROGRAMS FOR MONTGOMERY COUNTY:

Mr. David Brown, USGS Gulf Coast Program Chief, explained accessing public information of the groundwater monitoring system through the USGS website. Mr. Jason Ramage, USGS Lead Hydrologist, demonstrated and explained the USGS website illustrations of water level contours of the aquifer. USGS monitors water levels and collects data from the four aquifers that affect Montgomery County to determine forecast trends and the effectiveness of groundwater management, with scientific data influenced by population growth and groundwater withdrawal. USGS is focused on monitoring wells in the outcrop/recharge zones of the county. The system will determine predictive modelling of water availability at any given point in time. *A copy of the presentation is attached hereto as Exhibit "C".*

GROUNDWATER MANAGEMENT AREA 14 – UPDATE THE BOARD ON THE ISSUES RELATED TO JOINT PLANNING ACTIVITIES AND DEVELOPMENT OF DESIRED FUTURE CONDITIONS IN GMA 14:

Vice President Harry Hardman reported that he was graciously welcomed at the January 30th, GMA 14 meeting. He mentioned he, Bob Harden and Kathy Turner Jones are actively working with Groundwater Management 14 (GMA 14) to update and establish methodology for a new joint management plan, based on science and recommendations of the District.

Further, he announced a February 25th meeting that was planned to include the District's technical consultants as well as GMA 14's technical consultants for further discussions.

- a) Discuss, consider, and take action as necessary to approve LSGCD consultant participation and/or funding authorization.

Following discussion, Director Hardman motioned that the board approve the funding for the District's consultants to work with GMA 14. Director Bouché seconded. The motion passed.

- b) Discuss, consider, and take action as necessary regarding path forward utilizing Run D as the District's recommended model scenario in joint planning with GMA 14.

After some discussion, Director Hardman motioned to inform GMA 14 that the District no longer supports Run D as a methodology. Director Spigener seconded. Motion passed.

SUMMARY PRESENTATION OF THE PROPOSED REVISIONS AND AMENDMENTS TO THE DISTRICT'S GROUNDWATER MANAGEMENT PLAN AS REQUIRED BY CHAPTER 36 OF THE TEXAS WATER CODE AND CHAPTER 356 OF THE TEXAS WATER DEVELOPMENT BOARD'S (TWDB) RULES CONTAINED IN TITLE 30 OF THE TEXAS ADMINISTRATIVE CODE:

- a) Discuss, consider, and take action as necessary concerning approval of draft management plan for public comment.

Stacey Reese, District Counsel, summarized the main changes to the mission statement of the Draft Management Plan. Ms. Reese enumerated these goals as: 1) to afford opportunity for a fair share to every owner of each common reservoir, 2) adopt and enforce fair and impartial rules that allow for adjustment in the future to achieve Desired Future Conditions (DFC), and 3) collect and share information so each constituent and stakeholder can make informed decisions about their own groundwater. Ms. Reese mentioned that besides the changes to the goals there would be further consideration given to a new DFC. She explained that a public comment period is prescribed before the adoption of the Management Plan. She recommended that the Board approve the draft plan so that it can be published for public comment.

Director Spigener motioned to approve the draft Management Plan for publication with the given amendments. Director Rogers seconded. The motion carried.

GENERAL MANAGER'S REPORT:

Ms. Jones updated the board concerning a TAGD legislative subcommittee's recommendation for funding of data collection for groundwater districts and GMAs.

- a) Update regarding 2018 Annual Report for the Lone Star Groundwater District

Ms. Jones reported that staff is assimilating information and documents in preparation of developing a first draft template. Ms. Jones added that she had been in contact with printing companies soliciting layout and printing options, including costs. It is hoped that a rough draft will be available for board review sometime in March.

b) Update and findings on K and K Construction, Inc (Farrell Rd.) - #OP-11030401B – Memorandum, Thornhill Group, Inc:

Mr. Mike Thornhill joined the meeting via telephone relaying his findings regarding K and K Construction, Inc. and the claim that it was responsible for large amounts of water discharge into the quarry pit. Of note, are the report's conclusions in points 5 and 6 that relate to results of quarrying operations which did not detect adverse impacts to the aquifer or well owners. Additionally, as the quarry deepens, a future site visit may be warranted.

President Melder directed staff to send a courtesy copy of the report to both Conroe residents residing adjacent to K & K Construction and a third copy to K and K Construction, Inc.

GENERAL COUNSEL'S REPORT:

Ms. Reese had no further update or final comments than those previously discussed in Executive Session.

NEW BUSINESS:

President Melder opened the floor to take any agenda items for next month's meeting. Director Hardman suggested a review of current website and educational brochures to ensure that all materials are fact based. Director Rogers added that Bob Harden and Mike Thornhill, together with Kathy Jones present a recommendation to the Board concerning the District's Interlocal Agreement with USGS.

ADJOURN:

There being no further business, upon a motion made by Director Rogers and seconded by Director Prykryl, the meeting was adjourned at 8:08 PM.

PASSED, APPROVED, AND ADOPTED THIS 12th DAY OF MARCH 2019.



Stuart Traylor, Board Secretary



SIGN IN SHEET

February 12, 2019
Board Meeting

Do you wish to speak on an agenda item?	NAME	CITY, STATE, ZIP	E-Mail	Would you like to receive LSGCD updates & information?
No	TINA FELKAI	CONROE TX	ON FILE	
No	Scott Custer	TREE WOODLANDS, TX	ON FILE	
No	BILL BERAN	WALDEN		
No	Melenna Sloan	Shenandoah	already	✓
NO	Kenny Eickelberg	Shenandoah	on file	—
NO	JIM Servidio	CONROE		
we	Simons Sequeira	Magnolia		
NO	Margie Taylor			
No	Bill Kotkin	Conroe, Tx	on file	✓
No	Veronica Osagueda	City of Houston Houston, Tx		
NO	Prithvi Desai	City of Oak Ridge N.	on f. 6	
No	Claude Humbert	Spring	on file	
NO	JENNIFER SEALE	CONROE		



655 Conroe Park North, Conroe, TX 77303
Ph: (936) 494-3436 Metro: (936) 441-3437
www.lonestarged.org

Speaker Request Form

Those wanting to comment or register support for or against a specific agenda item are asked to fill out the Speaker Request Form.

Date of Meeting: 2-12-19
Name: Mike Reester (Not Present)
Address: w/LRE Water
City: _____ State: _____ Zip: _____
Email: _____

IF SPEAKING FOR AN ORGANIZATION:

Name of Organization LRE Water
Speaker's Official Capacity _____
Agenda Item No.: #9 USGS
 FOR (If applicable)
 AGAINST (If applicable)

Registering Position, NOT Testifying _____

To speak on an item not listed on the agenda, please indicate area of interest: ultimate goal is to advance the science in a way that benefit all stakeholders

Please remember to step to the lectern as soon as you are recognized by the chair; state your name before beginning your presentation. If you have written notes you wish to present to the Board, PLEASE FURNISH AN EXTRA COPY FOR DISTRICT FILES.

The Board will appreciate each speaker limiting an address on any one item to three (3) minutes * Thank you for your cooperation

* Only three speakers will be recognized speaking for and three speakers speaking against any one issue.

RESOLUTION NO. #19-001

LONE STAR GROUNDWATER CONSERVATION DISTRICT

RESOLUTION DESIGNATING

MARCH 10-16, 2019

AS "NATIONAL GROUNDWATER AWARENESS WEEK"

THE STATE OF TEXAS

§

COUNTY OF MONTGOMERY

§

WHEREAS, it is beneficial and necessary for the public to better understand and appreciate the value of groundwater to their communities and;

WHEREAS, the National Groundwater Association has designated one week each year "National Groundwater Awareness Week" to bring such attention to groundwater, such week this year being March 10 through March 16, and;

WHEREAS, management of the Gulf Coast Aquifer within the boundaries of Montgomery County is an essential purpose of Lone Star Groundwater Conservation District, as authorized by the 77th Texas Legislature through House Bill 2362 and;

WHEREAS, management of the Gulf Coast Aquifer is essential to further economic development of Montgomery County; and the Lone Star Groundwater District hereby supports water conservation and the use of alternative water supply choices that are economically reasonable and obtainable through a free market system.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE LONE STAR GROUNDWATER CONSERVATION DISTRICT AS FOLLOWS:

1. The Board of Directors of the District encourages the public within Montgomery County to mark "National Groundwater Awareness Week" as March 10-16, 2019 by learning about and discussing ways to best protect the Gulf Coast Aquifer, the cornerstone of the county's economic development.
2. The General Manager is authorized to take any and all action necessary for the implementation of this resolution.

AND IT IS SO ORDERED.

PASSED AND ADOPTED this 12th day of February 2019

LONE STAR GROUNDWATER CONSERVATION DISTRICT

By: Webb Melder
Webb Melder, President

ATTEST:

Stuart Traylor
Stuart Traylor, Board Secretary





Pumping well turbine, Montgomery County, Texas

40 years of USGS groundwater and land subsidence studies: *Houston-Galveston and Montgomery County areas of Texas*

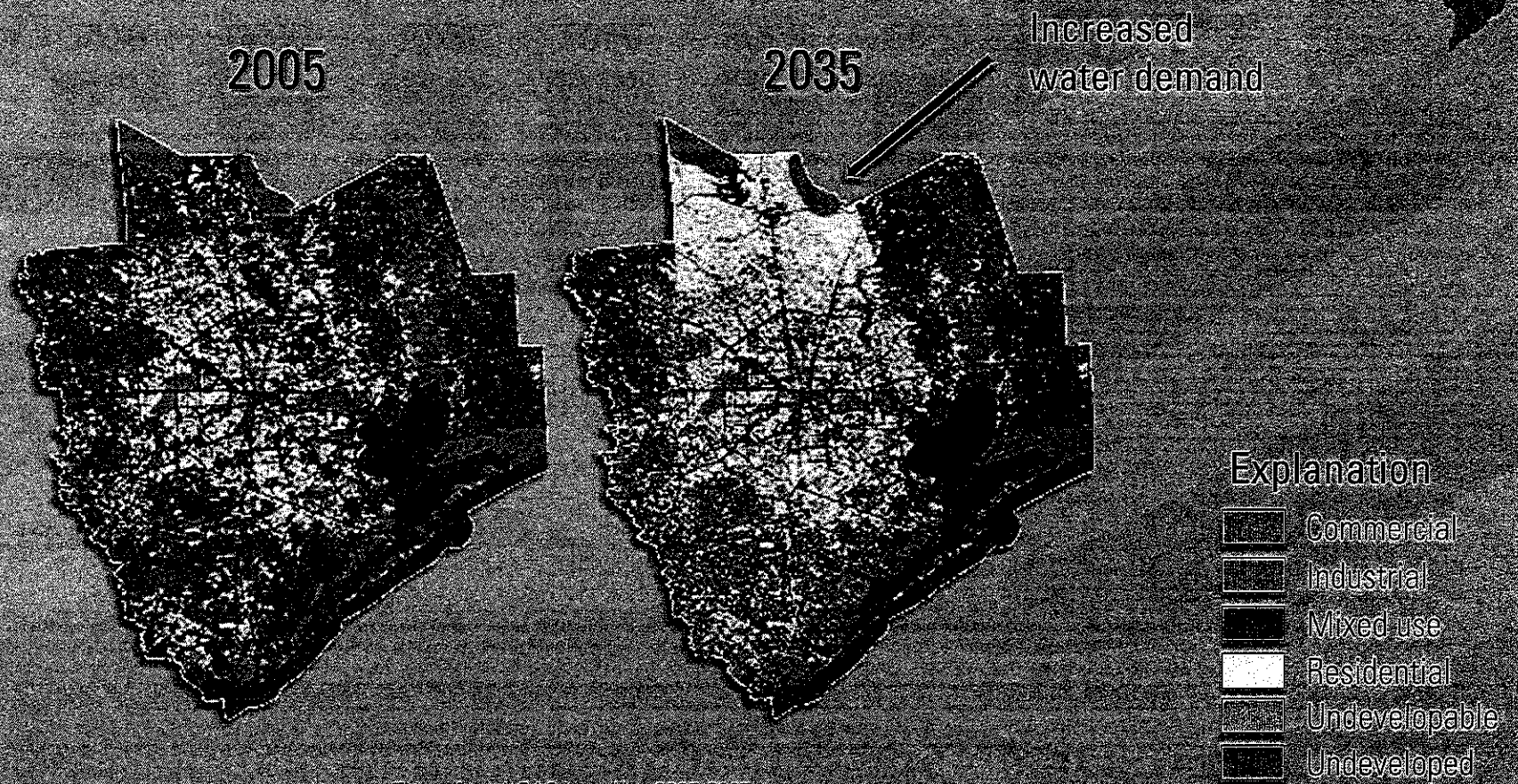
Jason Ramage | jkramage@usgs.gov
Hydrologist

John Ellis | jellis@usgs.gov
Chief, Hydrologic Studies

*USGS Texas Water Science Center
Houston Branch*

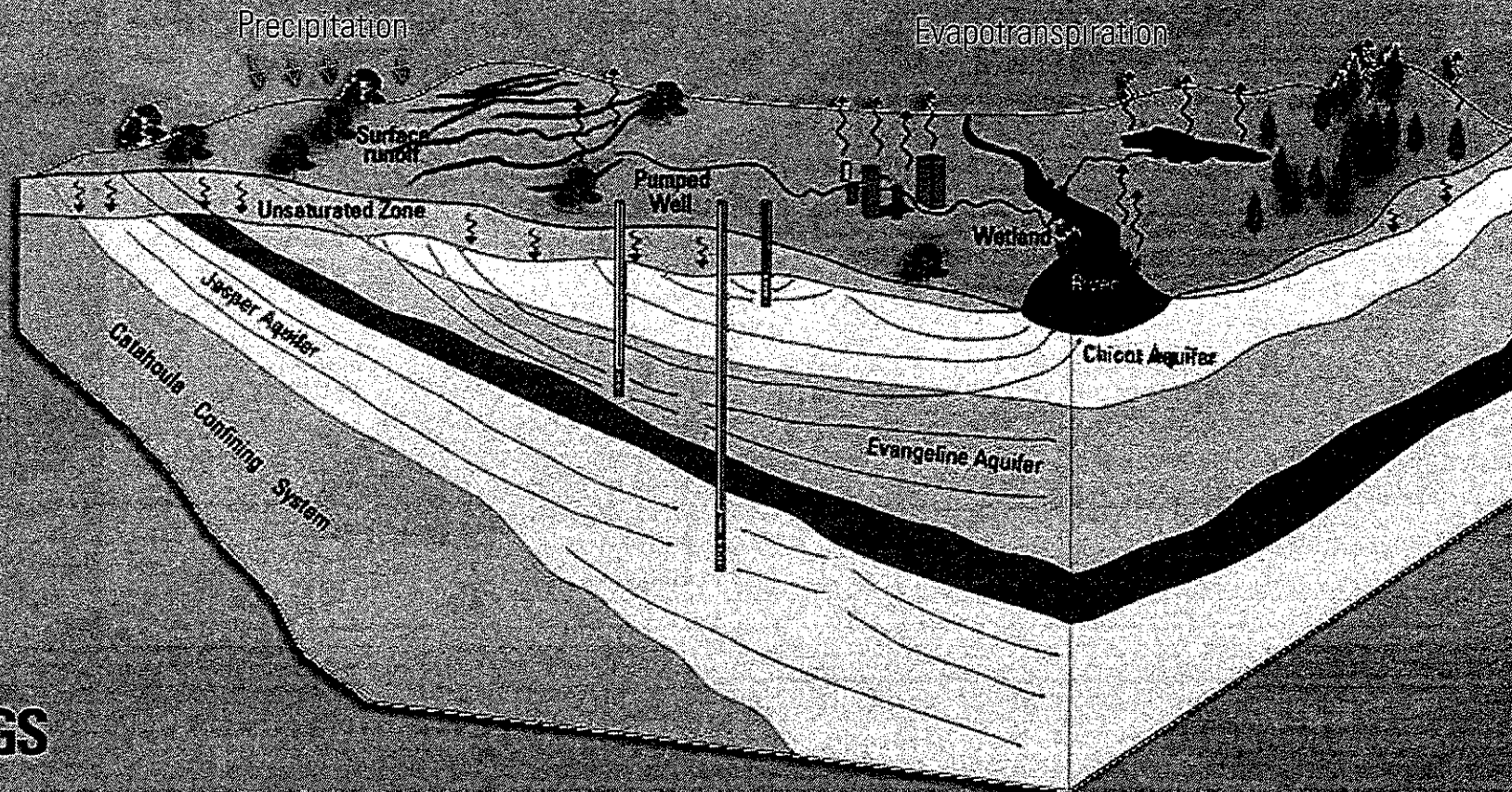
U.S. Department of the Interior
U.S. Geological Survey

Land use



Taken from HGAC Land Use 2005-2035

Conceptual Gulf Coast aquifer flow system



Annual groundwater and subsidence program

Initial planning:
Field maps, Software,
Logistics

Data gathering

Data
management
QA/QC

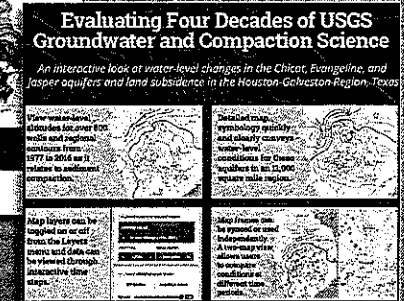
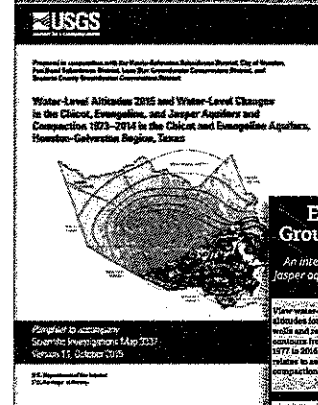
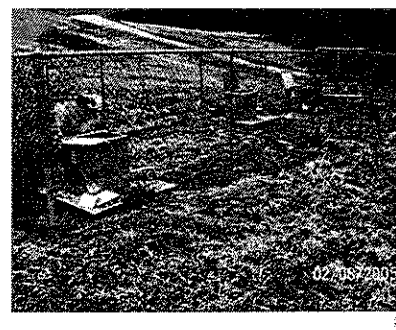
Results and Completion

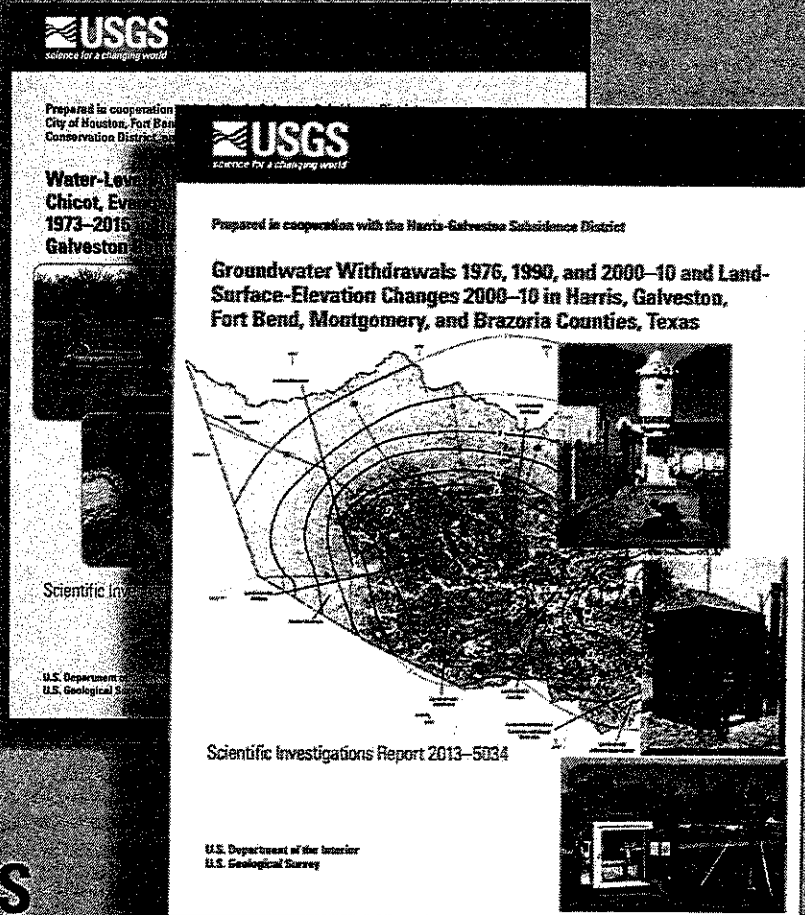
- Altitude maps
- 1 year changes
- 5 year changes
- Long term changes
- Publication

Month 1

Month 4

Month 5





Evaluating Four Decades of USGS Groundwater and Compaction Science

An interactive look at water-level changes in the Chicot, Evangeline, and Jasper aquifers and land subsidence in the Houston-Galveston Region, Texas

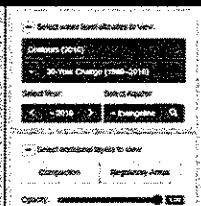
View water-level altitudes for over 800 wells and regional contours from 1977 to 2016 as it relates to sediment compaction.



Detailed map symbology quickly and clearly conveys water-level conditions for these aquifers in an 11,000 square mile region.



Map layers can be toggled on or off from the Layers menu and data can be viewed through interactive time steps.



Map frames can be synced or used independently. A two-map view allows users to compare conditions at different time periods.



Predictive modeling



In cooperation with the Texas Water Development Board and the Harris-Cadwallader Coastal Subsidence District

Hydrogeology and Simulation of Ground-Water Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas

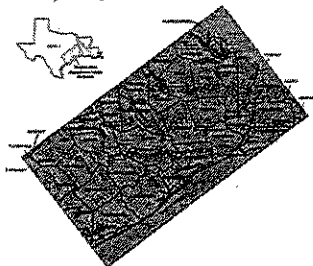
Scientific Investigations Report 2004-5102

U.S. Department of the Interior
U.S. Geological Survey



Prepared in cooperation with the Harris-Cadwallader Subsidence District, the Fox Bend Subsidence District, and the Lees Bay Groundwater Conservation District

Hydrogeology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas, 1891-2009



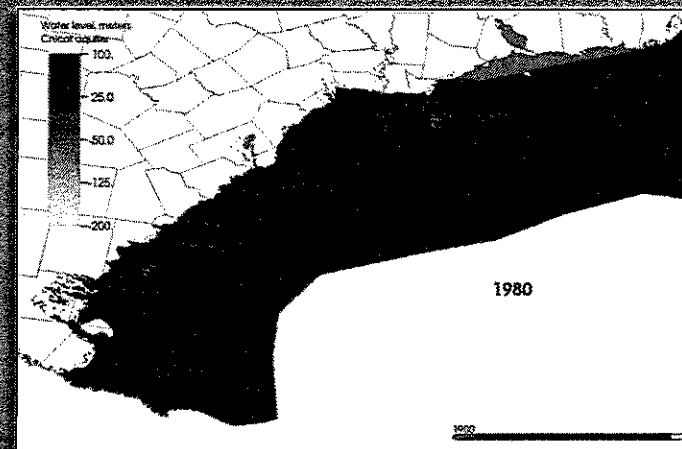
Scientific Investigations Report 2012-5154
Version 1.1, December 2013

U.S. Department of the Interior
U.S. Geological Survey

Northern Gulf Coast Groundwater
Availability Model (GAM)

Coastal Lowlands model

- USGS 5-year Groundwater Availability Study
- Publication of Scientific Investigations Report and data release (est 2021)



Water levels serve as "the" primary data required for calibration and testing of groundwater models

Typical length of water-level-data collection

Intended use of water-level data	Typical length of data-collection effort or hydrologic record required			
	Days/weeks	Months	Years	Decades
To determine the hydraulic properties of aquifers (aquifer tests)	✓	✓		
Mapping the altitude of the water table or potentiometric surface	✓	✓		
Monitoring short-term changes in ground-water recharge and storage	✓	✓	✓	
Monitoring long-term changes in ground-water recharge and storage			✓	✓
Monitoring the effects of climatic variability			✓	✓
Monitoring regional effects of ground-water development			✓	✓
Statistical analysis of water-level trends			✓	✓
Monitoring changes in ground-water flow directions	✓	✓	✓	✓
Monitoring ground-water and surface-water interaction	✓	✓	✓	✓
Numerical (computer) modeling of ground-water flow or contaminant transport	✓	✓	✓	✓

Taylor, C.; Alley, W., Ground-Water-Level Monitoring and the Importance of Long-Term Water-Level Data, USGS Circular 1217

- Water levels are collected over various lengths of time depending on their intended use
- Short-term measurements:
 - Mapping the water-table altitude
 - Drawdown from pumping
 - Monitoring fluctuations in groundwater levels during droughts
- Long-term measurements:
 - Changes in recharge and storage
 - Regional effects of groundwater development and climate variability

Explanation

- Most applicable
- ◻ Sometimes applicable

Catahoula water quality characterization – Alternative water supply

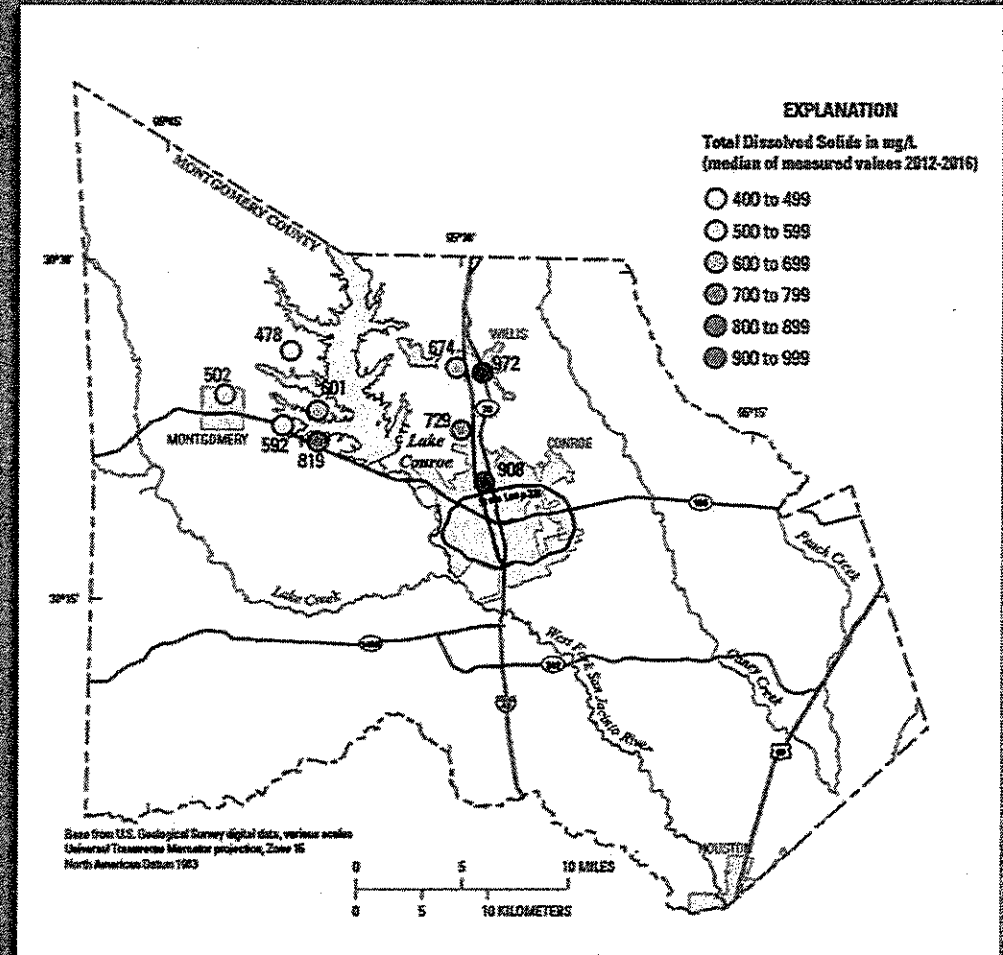
- Baseline water-quality data collected in newly developing water resource
- Substantial interest in characterizing this resource

Full suite sampling schedule- \$\$\$\$

- Field Parameters
- Major Ions
- TDS
- Trace Elements
- Isotopes
- Radionuclides
- Dissolved Gasses
- Noble Gases

Reduced resampling schedule- \$

- Field Parameters
- Major Ions
- TDS
- Nutrients



Questions?

