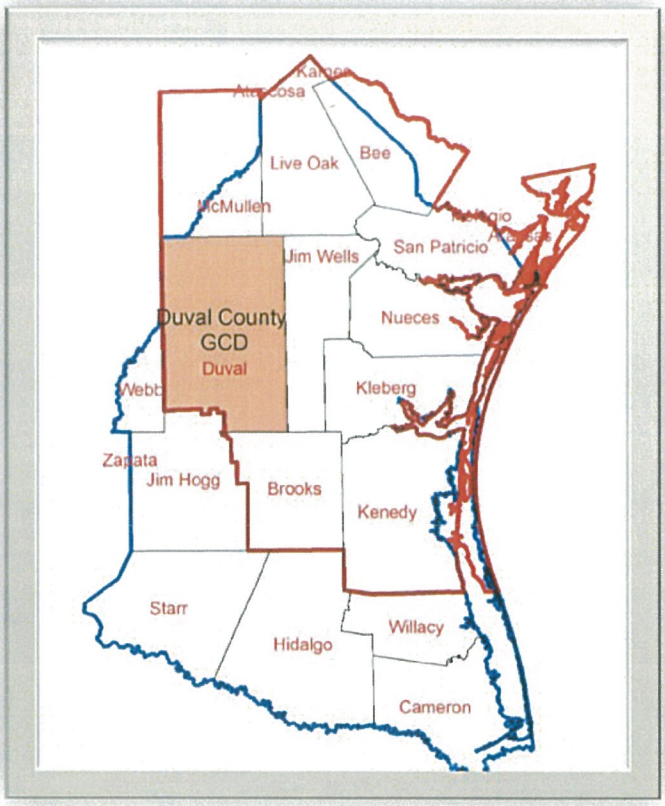

Duval County Groundwater Conservation District

Groundwater Management Plan

Plan Adopted: Draft 08/23/2017

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I. DISTRICT MISSION

The Duval County Groundwater Conservation District mission is to conserve and prevent waste and pollution of ground water resources, while addressing the needs of the district's citizens and maintaining the health of our environment for the present and for future generations.

II. DISTRICT INFORMATION

CREATION

The District is a groundwater conservation district created under and essential to accomplish the purpose of Section 59, Article XVI of the Texas Constitution. It was created as part of S.B. No. 1847 passed by the Texas Legislature in May of 2005. A confirmation election was held in the county on July 25, 2009 which confirmed the District's legal standing. The District is run by a five member Board of Directors. These directors are elected by the voters of the District and serve four year terms. One director is elected at large from within the District and the other four directors are elected one from each of the four county commissioners' precincts. The District encompasses all of Duval County and is located within Groundwater Management Area 16 and Regional Water Planning Group N.).

PURPOSE FOR THE DISTRICT

The purpose for the district, as per Texas Water Code 36, Section 36.0015, is to provide for the conservation, preservation, protection, recharging and prevention of waste of groundwater and of groundwater reservoirs or their subdivisions and to control subsidence caused by the withdrawal of water from those reservoirs. It has an obligation under Texas Water code 36.107 to develop a groundwater management plan that will state how the District will meet that purpose. Under Texas Water code 36c Section 36.101, the District has the authority to adopt and enforce rules that the District feels are needed to carry out that purpose.

III. PURPOSE OF THE GROUNDWATER MANAGEMENT PLAN

Purpose of The Plan: The purpose of this management plan is to help the District achieve its mission, while considering the needs of neighboring groundwater districts, coordinating its efforts with surface water management entities in the district area and complying with state mandated laws and regulations.

IV. GEOGRAPHIC CHARACTERISTICS OF THE DISTRICT

DISTRICT LOCATION AND GENERAL CHARACTERISTICS

Duval County is in south central Texas about fifty miles inland from the Gulf of Mexico and seventy-three miles north of the Rio Grande. It is bordered by Webb, La Salle, McMullen, Live Oak, Jim Wells, Brooks, and Jim Hogg counties. San Diego, the county seat is the most populous town, at the intersection of State highways 44 and 359 and Farm road 1329, about fifty-two miles west of Corpus Christi and eighty miles east of Laredo. State Highway 44 passes through the county from east to west, and State Highway 16 crosses from north to south. Two highways cross the county diagonally: U.S. Highway 59 and State Highway 359. The county comprises 1,795 square miles of nearly level to undulating terrain with an elevation ranging from 250 to 800 feet above sea level.

DEMOGRAPHIC CHARACTERISTICS

As per the 2010 US census, the population of the district was 11,782 which has declined from 13,120 people reported in 2000 census. In general, the population of the district has approximately been steady and hovered around 12,000 residents and has not seen dramatic shifts over last several decades (US Census, 2017).

The population density is estimated 7 people per square mile ($3/km^2$). The district is predominantly Hispanic (87.99% of the population was characterized as Hispanic or Latino of any race in US 2010 census). The average household size was 2.88 and the average family size was 3.40. Duval County is predominantly rural with no big metropolitan areas, major towns within the district are San Diego, Freer and Benevides. Unincorporated settlements include Concepcion, Ramirez, Realitos, Rios and Sejita.

HYDROLOGICAL CHARACTERISTICS

The northern part of the county drains into the Nueces River, while the central and southern parts drain into the Laguna Madre through Baffin Bay. The county gets about 21 inches of rainfall annually on average, but is subject to extreme climatic variations. The climate is classified as subtropical-sub humid. The average minimum temperature is 43° F in January, and the average maximum temperature is 98° in July. The potential evapotranspiration far exceeds the average annual rainfall and is estimated to be about 60 inches per year on average. There are no major surface water bodies in the district.

SOILS AND TOPOGRAPHY

Northern Duval County is characterized by loamy cracking or crumbly clayey soils, deep to moderately deep, that overlie indurated caliche. Western Duval County is characterized by deep soils and well-drained dark soils with loamy surface layers and clayey subsoils. Due to limited rainfall, the vegetation consists of small trees, shrubs, and cacti, with large areas of brush. The county's mineral resources include caliche, clay, salt domes, sandstone, uranium, oil, and gas. Less than 1 percent of the land in Duval County is considered prime farmland.

HYDROGEOLOGICAL CHARACTERISTICS

Two major aquifers, namely the Gulf Coast Aquifer and the Yegua Jackson Aquifer underlie the district. The Gulf Coast Aquifer is designated as a major aquifer, while the Yegua-Jackson is designated as a minor aquifer by the Texas Water Development Board. The Yegua Jackson aquifer is present only over a small portion of the district and as such not considered a major source of groundwater.

The Gulf Coast Aquifer on the other hand is a primary source of groundwater in the district. The Gulf Coast Aquifer consists of complex interbedded clays, silts, sands, and gravels of Cenozoic age, The aquifer system comprises four major units the Chicot Aquifer, the Evangeline Aquifer, the Burkeville Confining Unit and the Jasper Aquifer (see Figure 1). A very small portion of the Chicot aquifer outcrops within the district and this sliver is not shown in Figure 1. Additional details related to aquifer hydrogeology and and hydrostratigraphy can be found in (Baker, 1979; Waterstone, 2003; Young et al., 2013).

The Yegua-Jackson aquifer is a Tertiary age aquifer. The Yegua-Jackson unit consists principally of thin beds of sand, clay, silt with some lignite in the outcrop. It includes water-bearing parts of the Yegua Formation (part of the upper Claiborne Group) and the Jackson Group (comprising the Whitsett, Manning, Wellborn, and Caddell formations). The quality of water in this aquifer tends to be highly variable with large portions considered as brackish. As such, this aquifer may be a source of water in the future. Given the small extent of the aquifer within the district and lack of sufficient use, the aquifer is not considered at this stage (see Figure 1 for the footprint of the Aquifer within the district). Additional details on aquifer hydrogeology and hydrostratigraphy can be found in Preston (2006).

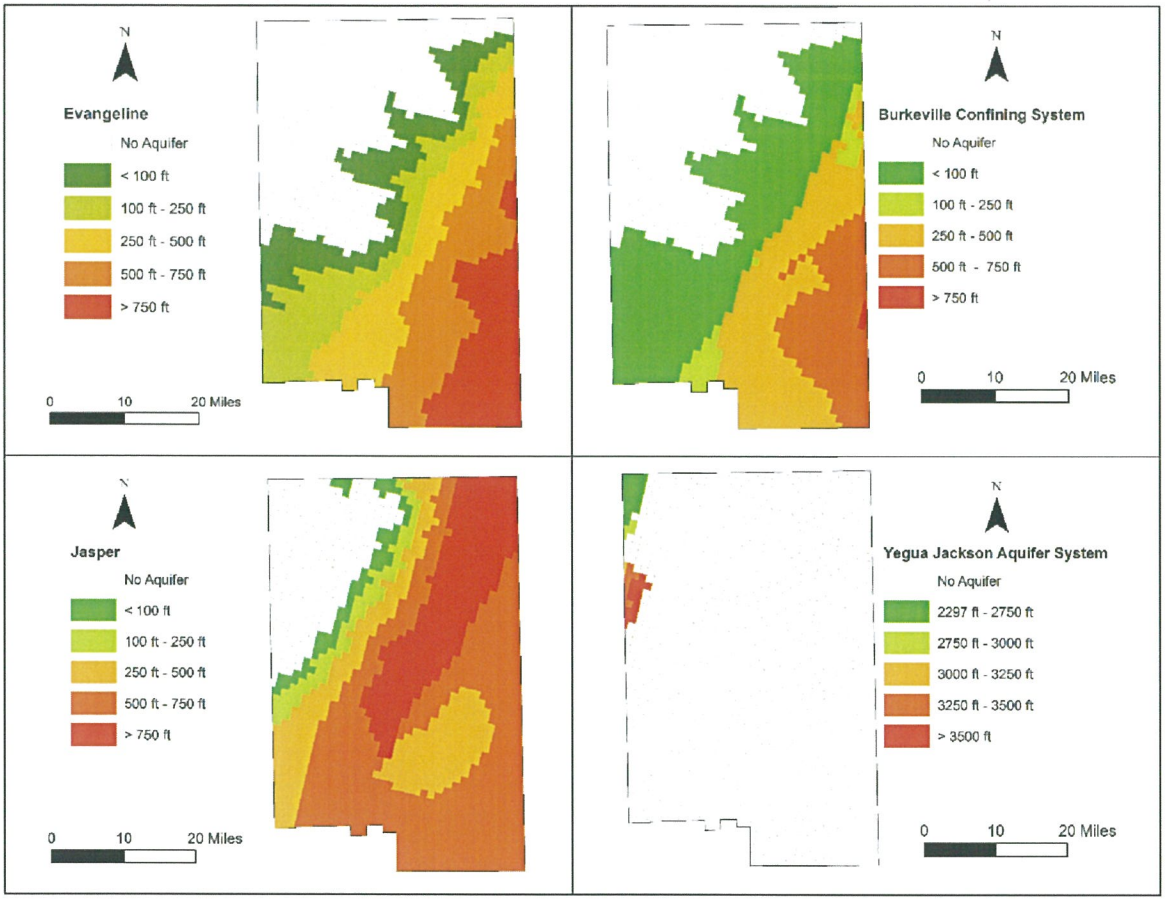

Figure 1: Aquifers within the Duval County Groundwater Conservation District and their Approximate Thickness (Evangeline, Burkeville Confining Unit and Jasper are part of the Gulf Coast Aquifer System; Data from: Hutchinson et al., 2011)

V. TECHNICAL INFORMATION REQUIRED BY TEXAS WATER CODE §36.1071 AND 31 TAC § 356.5

DESIRED FUTURE CONDITIONS AND MODELED AVAILABLE GROUNDWATER

As per Resolution No. 2017-001 adopted on January 17, 2017, the authorized voting representatives for Groundwater Management Area 16 established a desired future condition (DFC) of the Gulf Coast aquifer system which was an area-wide average drawdown of approximately 62 feet in December 2060 from estimated year 2010 condition. Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 104 feet in December 2060 from estimated year 2010 conditions.

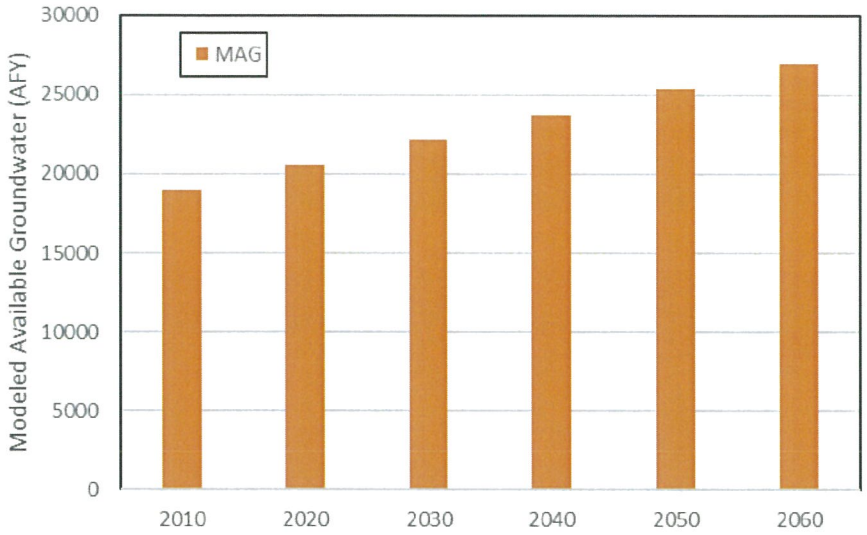

Figure 2: Modeled Available Groundwater for Duval County Groundwater Conservation District (data from Goswami, 2017)

The most recent estimates of modeled available groundwater (MAG) is shown in Figure 2. The MAG value changes from 18,963 AFY in 2010 to about 27,000 AFY in the year 2060. These data were obtained from GAM Run 17-025 (Goswami, 2017) which is presented in Appendix F of the report.

ANNUAL GROUNDWATER USE

Estimate of the amount of groundwater being used within the District on an annual basis, as required by Texas Water Code § 36.1071(e)(3)(B) and 31 TAC § 356.5(a)(5)(B). (All site-specific information relied upon in developing this estimate has previously been provided to the Executive Administrator for comment, as required by Texas Water Code §36.1071(b) and 31 TAC § 356.5(b)).

Detailed data on annual water use is provided in Appendix D and based on historical water use survey (Allen, 2017). The surface water use in the district is negligible and mostly for livestock use it has been reported in the range of 862 – 58 AFY over the years 2010 – 2014. The groundwater use in the district is shown in Table 1. Municipal, irrigation, livestock and mining are the four major users of water in the district. The groundwater use in the district has ranged around 5000 acre-feet per year in the last few years.

Table 1: Estimated Groundwater Use in the District (Data from Allen et al., 2017)

Year	Municipal	Mining	Irrigation	Livestock	Total
2000	2344	4212	4524	88	11168
2001	2349	4269	5170	37	11825
2002	2289	4267	8140	52	14748
2003	2253	4271	3438	52	10014
2004	2266	4267	4272	53	10858
2005	2356	4373	3803	648	11180
2006	2331	1894	3241	652	8118
2007	2178	880	2870	679	6607
2008	2309	816	3285	691	7101
2009	2003	773	2092	722	5590
2010	1947	804	1642	639	5032
2011	2102	749	2298	631	5780
2012	2051	329	4042	545	6967
2013	2026	354	1940	507	4827
2014	1662	611	1640	558	4471

ANNUAL RECHARGE FROM PRECIPITATION

Estimate of the annual amount of recharge from precipitation to the groundwater resources within the District, as required by Texas Water Code § 36.1071(e)(3)(C) and 31 TAC § 356.5(a)(5)(C). No site-specific information was used in developing this estimate.

The outcrops of the Gulf Coast Aquifer and the Yegua-Jackson aquifers within the district receive recharge from precipitation within the district. Estimates for these values are summarized in Table 2 and derived using Southern Gulf Coast Groundwater Availability Model (Chowdhury and Mace, 2004) and the Yegua-Jackson GAM (Deeds et al., 2010). The reported values are historical averages over a period of 1981-1999 for the Gulf Coast Aquifer and 1980-1997 for the Yegua-

Jackson Aquifer and obtained using model calibration. Additional details pertaining to GAMs, assumption and limitations can be found in Goswami (2016) which is presented in Appendix E.

Table 2: Estimated Recharge from Precipitation (Data from Goswami, 2016; GAM Run 16-011)

Aquifer	Recharge from Precipitation (AFY)
Gulf Coast	18509
Yegua-Jackson	12

Annual Discharge to Surface Water Bodies

For each aquifer in the District, estimate the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers, as required by Texas Water Code § 36.1071(e)(3)(D) and 31 TAC §356.5(a)(5)(D). No site-specific information was used in developing this estimate.

Table 3: Estimated Discharges to Surface Water Bodies including Springs, Streams and Rivers (Data from Goswami, 2016; GAM Run 16-011)

Aquifer	Discharge to Surface Water Bodies (AFY)
Gulf Coast	11537
Yegua-Jackson	0

No major rivers flow through Duval County. There are however several small creeks within the district. The estimated discharges of the Gulf Coast Aquifer to these surface water bodies is estimated to be 11, 537 based on model runs (Table 3 and Appendix E). However, the surface water-groundwater interactions are likely to exhibit considerable spatial and temporal variability within the district. The Yegua-Jackson Aquifer does not exchange water with surface water bodies in the district.

Groundwater Flow Into and Out of the District and Between Aquifers in the District

Estimate of the annual volume of flow into and out of the District within each aquifer, and between aquifers, in the District, if a groundwater availability model is available, as required by Texas

Water Code § 36.1071(e)(3)(E) and 31 TAC § 356.5(a)(5)(E). No site-specific information was used in developing this estimate.)

Table 4: Groundwater Inflows and Outflows of the District (Data from Goswami, 2016; GAM Run 16-011)

Aquifer	Inflow into the District (AFY)	Outflow from the District (AFY)
Gulf Coast	3,830	10,341
Yegua-Jackson	296	131

Table 4 and Appendix E present the data of groundwater flows into and outflows from the district. Being in the up-dip area of the Gulf Coast Aquifer system, the net outflows from the district exceed the inflows into the aquifer. The net flows depend critically on extent of groundwater production in the region. The net inflow into the Yegua-Jackson exceeds the outflows at this point of time. However, the flows in this aquifer are low and not suitable for large-scale projects.

Table 5: Groundwater Inflows and Outflows between Aquifer Units in the District (Data from Goswami, 2016; GAM Run 16-011)

Aquifer	Flow (AFY)
Gulf Coast	Not Applicable as the model assumes a no flow boundary at the bottom
Yegua-Jackson subcrop to outcrop	62
Catahoula to Yegua-Jackson	103

The interactions among various aquifers in the region is low and is summarized in Table 5. The reader is referred to Goswami (2016) presented in Appendix E for a more detailed description.

PROJECTED SURFACE WATER SUPPLY

Estimate of the projected surface water supply within the District, according to the most recently adopted state water plan, as required by Texas Water Code § 36.1071(e)(3)(F) and 31 TAC § 356.5(a)(5)(F).

A total of 148 AFY is projected as surface water supplies available in the Duval County by Region N water planning group. These supplies are for livestock water user group and represent surface

water collected in cattle tanks. This projected supply is assumed to be constant over the entire planning period (2010 – 2060). Of the estimated 148 AFY, 20 AFY is estimated to be available in the Nueces basin while the remaining (128 AFY) to be available in the Nueces-Rio Grande Basin (also see Allen 2017, Appendix D for additional details).

PROJECTED DEMAND FOR WATER

Estimate of the projected total demand for water within the District according to the most recently adopted state water plan, as required by Texas Water Code § 36.1071(e)(3)(G) and 31 TAC § 356.5(a)(5)(G). (No site-specific information was relied upon in developing this estimate. It is taken from the 2017 State Water Plan.)

The projected water demands as per the 2017 state water plan is shown in Figure 3. It is projected that the water demands will steadily increase from around 7000 AFY to over 8000 AFY by the year 2060. The increases are largely due to growing municipal and irrigation demands. Mining demands are projected to decrease over time while the livestock demands are projected to stay steady. Data from the most recent state water plan is presented in Appendix D.

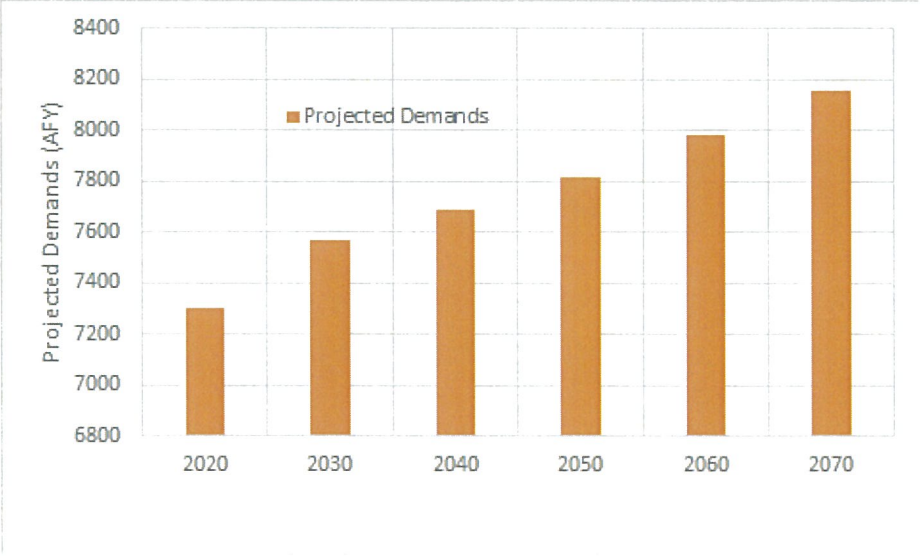

Figure 3: Projected Water Demands within Duval County Groundwater Conservation District

VI. CONSIDERATION OF ADOPTED STATE WATER PLAN

Consideration of water supply needs and water management strategies that are included in the adopted state water plan, as required by Texas Water Code § 36.1071(e)(4) and 31 TAC § 356.5(a)(7).

The District reviewed the 2017 State Water Plan for comparisons of water demands and supply estimates on a county-by-county basis prepared by Region M (Rio Grande Regional Water Planning Area)] The District identified potential water deficits and management strategies that could have an impact on the groundwater resources within the District. As per the recent state water plan, Analysis of the demands for different water use groups was carried out with an emphasis on groundwater related strategies.

The projected deficits in the district are low and mostly related to municipal demands (see Appendix D for additional details). Municipal water conservation and tapping into groundwater resources are seen as management strategies to overcome projected deficits. The district will continue to monitor these strategies and any other projects that may arise in the future.

VII. MANAGEMENT OF GROUNDWATER SUPPLIES

The district will manage the supply of groundwater within the District to maintain economic viability of both public and private user groups. The District will:

- Identify and engage in such activities and practices, that if implemented, would manage the groundwater resources in the District while considering the economc and cultural activities occurring within the district.
- Coordinate with Texas Water Development Board (TWDB), Regional Water Planning Groups (RPWG) and other neighboring groundwater conservation districts (GCDs) in order to monitor changing groundwater quality and storage conditions of groundwater supplies within the district.
- Make periodic assessments of water supply and groundwater storage conditions and report those conditions to the Board and to the public.
- Develop groundwater production, well spacing rules and permitting guidelines for non-exempt wells as necessary to manage groundwater supplies within the District.

The District will continue to employ all technical resources at its disposal to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures.

VIII. ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR DISTRICT IMPLEMENTATION OF MANAGEMENT PLAN

The District was initially operating on the basis of a set of rules that were repealed by the District on February 16, 2010. Since that time, the District has undertaken many beneficial activities and actions as it manages the groundwater resources of Duval County. During the last six years, the Texas Legislature has made many changes to the laws governing groundwater management and groundwater conservation districts. Additionally, the District has gained an increased knowledge about the Duval County groundwater resources as a result of its management efforts, groundwater sampling program, registration and permitting of wells, and well plugging reimbursement program. Because of these changes, the Board of Directors determined that the time had come to review and update the District's current Rules. This rulemaking process is the result of that decision any many months of review and consideration of needed changes. Our rules were then adopted at a public hearing on October 25, 2016. A copy of these rules is currently available for viewing by the public at the District office. These rules will set up for viewing by the public in the District's official webpage.

The District's rules are promulgated under the District's statutory authority (primarily Senate Bill 1847 and Texas Water Code Chapter 36) to achieve the following objectives: To provide for conserving, preserving, protecting and recharging of the groundwater or of a groundwater reservoir or its subdivisions in order to control subsidence, prevent degradation of water quality or prevent waste of groundwater. The District's orders, rules, regulations, requirements, resolutions, policies, guidelines or similar measures have been implemented to fulfill these objectives.

The District will amend these rules as necessary to comply with changes to Chapter 36 of the Texas Water Code and to insure that these rules address the current needs of the District and its citizens.

IX. TIME PERIOD FOR THE PLAN

Time Period for This Plan: This plan becomes effective upon adoption by the Duval County Groundwater District Board of Directors and certification as administratively complete by the Texas Water Development board. The plan remains in effect until revised by the District. This plan will be reviewed by the District Board of Directors at least every five years and updated or revised as needed based on current conditions and needs. All amendments or revisions to this plan will be submitted to the Texas Water Development Board for approval.

X. PLAN APPROVAL REQUIREMENTS

A. Public Hearing

Evidence of required public hearings notice and Board meeting to review input is included in Appendix B.

B. Board Resolution

A certified copy of the resolution by the Board of directors, adopting this plan is included in Appendix A.

C. Coordination with Surface Water Management Entities.

Evidence that all surface water entities in the District boundaries were notified is included in the form of a copy of the cover letter transmitting a copy of the Plan to the Nueces River Authority and the South Texas Watermaster Program. (see Appendix C)

D. Coordination with other Groundwater Districts

Evidence that other districts in the area were made aware of this plan is included in the form of a copy of the cover letter transmitting a copy of this plan to Groundwater Management Area 16. (Appendix C)

XI. MANAGEMENT GOALS, OBJECTIVES AND PERFORMANCE STANDARDS

EFFICIENT USE OF GROUNDWATER

Goal: Provide the most efficient use of groundwater.

Management Objective: The District will encourage the efficient use of groundwater by informing the public about the need for and methods of groundwater use efficiency.

Performance Standard: The District will publish one article in a local publication media or will acquire and distribute one informational bulletin on groundwater efficiency at least once annually.

CONTROL AND PREVENT WASTE

Goal: Control and prevent waste of groundwater.

Management Objective: The District will address and attempt to control the waste of groundwater resources.

Performance Standard 1: The District will adopt a set of rules that address the waste of groundwater within the District by no later than the end of 2017.

Performance Standard 2: The District will conduct a thorough review of these adopted rules at least annually to assure that they are current and that they are being enforced as intended. This annual review will be recorded in the official minutes of the District's meetings.

Performance Standard 3: The District will develop or acquire an informational bulletin that addresses and explains the need for the prevention of waste in groundwater. A copy of this bulletin will be delivered to each entity that drills a well within the District.

CONTROL AND PREVENT SUBSIDENCE

Goal: Control and prevent subsidence.

Management Objective: Monitor possible subsidence problems that might occur within the District.

Performance Standard: The District will investigate any reports of subsidence occurrence or of potential subsidence problems within the county. The month following such a report or annually if no such report or occurrence is noted, a briefing will be presented to the District Board to determine what, if any, course of action is needed. This briefing will be recorded in the official minutes of the District's meetings.

CONJUNCTIVE SURFACE WATER MANAGEMENT ISSUES

Goal: To review and address any conjunctive surface water management issues.

Management Objective 1: The District will participate in the regional water planning process by reviewing current issues and by maintaining contact with the Region N Regional Water Planning Group.

Performance Standard: A representative of the District will attend at least one or as many meetings as deemed needed per year of the Region N Regional Water Planning Group. Following any such meeting attendance, a report will be given by the District representative to the District Board of Directors and such report will be recorded in the official meeting minutes for the District.

Management Objective 2: The District will participate and coordinate its efforts with all surface water entities that have jurisdiction or operate within the District boundaries.

Performance Standard: Letters will be sent to the Nueces River Authority and to the South Texas Watermaster Program, introducing the District and indicating the Districts desire to

cooperate with these surface water entities. Following initial contact with each of the surface water entities, the District will review their response and decide what further contact is needed and what cooperative efforts will be planned. This decision will be noted in the District's meeting minutes.

Natural Resource Issues

Goal: To address natural resource issues that impact or are impacted by the use of groundwater within the District.

The District is sensitive to all issues that involve our natural resources, including both biotic, such as plants, animals (both wildlife and domestic), fossil fuels such as oil, natural gas and coal and abiotic such as soil, water, air and heavy metals such as uranium. Some of these, such as water, we can impact directly, some of the others we can impact only indirectly.

Management Objective 1: Monitor soil salinity levels on soils that are irrigated with the use of groundwater.

Performance Standard: Conduct or obtain at least one annual soil salinity test from each, an irrigated cropland field and an irrigated pasture within the District. Monitor salinity changes annually and maintain a log of such soil salinity test results.

Management Objective 2: Monitor groundwater quality within the District.

Performance Standard 1: The District will conduct or will arrange to have water in selected wells tested for salinity (total salts) and for Nitrate (NO_3). Starting in 2013, at least one new well drilled each year will be tested. Test results will be kept on file with the District.

Performance Standard 2: The District will partner with the local County Agricultural Extension Service office to participate or sponsor an annual water well sample testing day conducted by the Extension Service. Test results will be recorded and maintained by the District.

Management Objective 3: Maintain vigilance on activities dealing with potential pollution and governmental regulations that impact groundwater.

Performance Standard: The District will review all correspondence or reports that it receives pertaining to injection well permitting and land treatment facilities. Such reviews will be recorded in the minutes of the District meetings.

Drought Conditions

Goal: To address drought conditions within and beyond the District boundaries.

Drought has been a frequent historical occurrence in the area of the Duval County Groundwater Conservation District. The District feels that this will not change in the future and must be prepared for drought. Historically the area of Duval County has, overall, not experienced severe groundwater shortages during drought. This situation could change due to increased water demands or due to an exceptional prolonged drought, although it is not anticipated. The Texas Water Development Board drought page will be used as a source of reference information to keep track of drought conditions: **http://www.twdb.state.tx.us/data/drought/**

Management Objective 1: Maintain vigilance and monitor groundwater levels to determine what effect droughts are having on groundwater tables within the District.

Performance Standard 1: The District will monitor changes in groundwater levels that occur annually and historically by reviewing water level measurements conducted annually by the Texas Water Development Board. This annual review will be discussed with the District Board of Directors and the findings will be recorded in the District's meeting minutes.

Performance Standard 2: The District will initiate its own groundwater level monitoring system by starting an annual water level measurement on at least one new well that is drilled each year within the District, starting in 2013.

Management Objective 2: Monitor the Palmer Drought Severity Index conditions for Duval County and correlate to groundwater levels within the District.

Performance Standard 1: Each month the District will download the most recent Palmer Drought Severity Index, review it and keep it on file.

Performance Standard 2: At least annually, a report will be made to the District Board of Directors on the most recent Drought Severity Index conditions and the conditions that occurred throughout the last year and will be compared to groundwater levels in the District. This annual review will be recorded in the District's official meeting minutes.

CONSERVATION

Goal: Conserve groundwater resources.

Management Objective 1: The District will address and will encourage the conservation of the groundwater resources within the district and elsewhere.

Performance Standard 1: The District will adopt a set of rules that address the conservation of groundwater resources by no later than the end of 2017.

Performance Standard 2: The District will conduct a thorough review of the District rules at least annually to assure that the rules are current and that they are being enforced as intended to conserve water. This review will be recorded in the official minutes of the District meetings prior to the end of each year.

Management Objective 2: The District will develop or will acquire an informational bulletin that address and explains the need for conservation of groundwater. A copy of this bulletin will be delivered to each entity that drills a well within the District.

Performance Standard: At least one informational article that addresses conservation of our groundwater will be made available for public viewing by one of the following: 1. Submit article to a local newspaper publication. 2. Conduct a public presentation. 3. Present exhibits at local events. 4. Publicize in the District webpage.

RECHARGE ENHANCEMENT

Goal: Recharge enhancement.

No known cost-effective method of recharge enhancement has been noted for the area of the Duval County Groundwater Conservation District. The District plans no action on this statutory goal. This goal is not applicable at the present time.

RAINWATER HARVESTING

Goal: Rainwater harvesting.

The District does not consider this item to be a groundwater issue, other than its use to help cut down on the use of groundwater where applicable. The District does feel that rainwater harvesting has a use within the District. Rainwater harvesting can be used to provide water for domestic use, to provide drinking water for wildlife and domestic livestock in areas where groundwater is difficult to obtain or is lacking. The technique can also be used to help reduce the amount of groundwater that is used where groundwater is available.

Management Objective: Promote the use of rainwater harvesting.

Performance Standard 1: The District will partner USDA-NRCS and the County AgriLife Extension Service office within the District to publicize and promote rainwater harvesting during at least one annual public event.

Performance Standard 2: The District will help distribute informational materials on rainwater harvesting by posting the information on the District website.

Precipitation Enhancement

This goal is not currently applicable. No action is planned by the District on this item at the present time.

Brush Control

Goal: Brush control.

The District feels that brush control can be an effective land treatment practice that can result in more grass production which can in turn help catch and hold rainwater so that it infiltrates into the ground rather than runoff as surface water or evaporate. In general, brush control is expensive and its benefits can be short lived, especially if not accompanied with other management practices.

Management Objective: Promote the use of brush control.

Performance Standard: Sponsor or co-sponsor at least one annual demonstration or field day on brush control with the USDA-NRCS, the local Agua Poquita Soil and Water Conservation District and/or the Agricultural Extension Service office.

Addressing The Desired Future Conditions Adopted by The District

Goal: To address and monitor the status of the Desired Future Conditions Adopted by the District.

Management Objective 1: Monitor groundwater pumping changes in the District.

Performance Standard 1: The District will review groundwater pumping figures within the District to determine compliance with the Desired Future Condition. An annual report of the data will be compiled by October of the following year.

Performance Standard 2: Every five years the District will review the pumping figures for the prior five years within the district, to determine if the Desired Future Condition is still applicable. The first review will be made by October 2017.

Management Objective 2: Monitor groundwater levels within the District.

Performance Standard 1: The district will annually review groundwater well measurements conducted by the Texas Water Development Board to determine long term trends. The annual review will be noted in the official minutes of the District meetings.

Performance Standard 2: The District will initiate a groundwater monitoring system by starting an annual water level measurement on at least one new well annually, starting in 2018.

XII. TRACKING PROGRESS IN ACHIEVING PLAN GOALS

SELF ANALYSIS

District Self Analysis – The district will prepare an annual report which will review any actions the District has taken during the past year to accomplish its Management Plan Goals. The report will be submitted to the District board of Directors by January of each year starting with 2013.

PUBLIC EVALUATION

Public Evaluation – The annual report noting actions taken and accomplishments on the District's Management Plan Goals will be kept on file by the District for review by the public as requested. The District's Management Plan will be posted on the official webpage for view by the public.

XIII. APPENDICES

Appendix A – Resolution Adopting Duval County Groundwater Conservation District Management Plan

Appendix B - Notice of Hearing on the 2017 Duval County Groundwater Conservation District Groundwater Management Plan

Appendix C - Letters to the Relevant Regional Water Planning Groups

Appendix D - Estimated Historical Groundwater Use and 2017 State Water Plan Datasets – Duval County Groundwater Conservation District, Dated April 17, 2017 (Author: Stephen Allen, 2017)

Appendix E - GAM Run 16-011: Duval County Groundwater Conservation District Management Plan (Author: Rohit Raj Goswami 2016)

Appendix F – GAM Run 17-025 MAG: Modeled Available Groundwater in the Gulf Coast Aquifer in Groundwater Management Area 16

Appendix G - References

Appendix A
Resolution Adopting the 2017 Duval County Groundwater Conservation District Groundwater Management Plan

Appendix B
Notice of Hearing on the 2017 Duval County Groundwater Conservation District Groundwater Management Plan

Appendix C

Letters to Regional Water Planning Groups and Other Water Entities

Appendix D

Estimated Historical Groundwater Use and 2017 State Water Plan Datasets – Duval County Groundwater Conservation District, Dated April 17, 2017 (Author: Stephen Allen, 2017)

Estimated Historical Water Use And 2017 State Water Plan Datasets:

Duval County Groundwater Conservation District

by Stephen Allen
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Groundwater Division
Groundwater Technical Assistance Section
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(512) 463-7317
April 17, 2017

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf

The five reports included in this part are:

1. Estimated Historical Water Use (checklist item 2)

   from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)

   from the 2017 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2017 SWP data available as of 4/17/2017. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2017 SWP. District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2017 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2016. TWDB staff anticipates the calculation and posting of these estimates at a later date.

DUVAL COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2015	GW	1,411	0	375	0	1,584	528	3,898
	SW	0	0	0	0	0	59	59
2014	GW	1,662	0	611	0	1,640	558	4,471
	SW	0	0	0	0	0	62	62
2013	GW	2,026	0	354	0	1,940	507	4,827
	SW	0	0	0	0	0	56	56
2012	GW	2,051	0	329	0	4,042	545	6,967
	SW	0	0	0	0	0	60	60
2011	GW	2,102	0	749	0	2,298	631	5,780
	SW	0	0	359	0	0	70	429
2010	GW	1,947	0	804	0	1,642	639	5,032
	SW	0	0	790	0	0	71	861
2009	GW	2,003	0	773	0	2,092	722	5,590
	SW	0	0	737	0	0	80	817
2008	GW	2,309	0	816	0	3,285	691	7,101
	SW	0	0	685	0	0	76	761
2007	GW	2,178	0	880	0	2,870	679	6,607
	SW	0	0	0	0	0	76	76
2006	GW	2,331	0	1,894	0	3,241	652	8,118
	SW	0	0	0	0	0	72	72
2005	GW	2,356	0	4,373	0	3,803	648	11,180
	SW	0	0	0	0	0	72	72
2004	GW	2,266	0	4,267	0	4,272	53	10,858
	SW	0	0	0	0	0	777	777
2003	GW	2,253	0	4,271	0	3,438	52	10,014
	SW	0	0	0	0	0	759	759
2002	GW	2,289	0	4,267	0	8,140	52	14,748
	SW	0	0	0	0	0	749	749
2001	GW	2,349	0	4,269	0	5,170	37	11,825
	SW	0	0	0	0	0	552	552
2000	GW	2,344	0	4,212	0	4,524	88	11,168
	SW	0	0	0	0	0	785	785

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

DUVAL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
N	LIVESTOCK, DUVAL	NUECES	NUECES LIVESTOCK LOCAL SUPPLY	28	28	28	28	28	28
N	LIVESTOCK, DUVAL	NUECES-RIO GRANDE	NUECES-RIO GRANDE LIVESTOCK LOCAL SUPPLY	120	120	120	120	120	120
	Sum of Projected Surface Water Supplies (acre-feet)			**148**	**148**	**148**	**148**	**148**	**148**

Projected Water Demands
TWDB 2017 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

DUVAL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	BENAVIDES	NUECES-RIO GRANDE	236	242	250	259	266	272
N	COUNTY-OTHER, DUVAL	NUECES	39	40	41	42	43	44
N	COUNTY-OTHER, DUVAL	NUECES-RIO GRANDE	510	519	527	539	553	566
N	FREER	NUECES	650	672	691	717	737	754
N	IRRIGATION, DUVAL	NUECES	150	158	166	174	183	192
N	IRRIGATION, DUVAL	NUECES-RIO GRANDE	2,854	2,996	3,146	3,304	3,468	3,642
N	LIVESTOCK, DUVAL	NUECES	111	111	111	111	111	111
N	LIVESTOCK, DUVAL	NUECES-RIO GRANDE	643	643	643	643	643	643
N	MINING, DUVAL	NUECES	125	130	122	112	105	99
N	MINING, DUVAL	NUECES-RIO GRANDE	1,263	1,314	1,230	1,129	1,060	1,005
N	SAN DIEGO	NUECES-RIO GRANDE	724	746	765	791	813	832
	Sum of Projected Water Demands (acre-feet)		**7,305**	**7,571**	**7,692**	**7,821**	**7,982**	**8,160**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

DUVAL COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	BENAVIDES	NUECES-RIO GRANDE	132	126	118	109	102	96
N	COUNTY-OTHER, DUVAL	NUECES	22	21	20	19	18	17
N	COUNTY-OTHER, DUVAL	NUECES-RIO GRANDE	79	70	62	50	36	23
N	FREER	NUECES	281	259	240	214	194	177
N	IRRIGATION, DUVAL	NUECES	50	42	34	26	17	8
N	IRRIGATION, DUVAL	NUECES-RIO GRANDE	846	704	554	396	232	58
N	LIVESTOCK, DUVAL	NUECES	0	0	0	0	0	0
N	LIVESTOCK, DUVAL	NUECES-RIO GRANDE	0	0	0	0	0	0
N	MINING, DUVAL	NUECES	13	7	16	26	33	37
N	MINING, DUVAL	NUECES-RIO GRANDE	3,255	3,205	3,288	3,389	3,458	3,515
N	SAN DIEGO	NUECES-RIO GRANDE	1	-21	-40	-66	-88	-107
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**-21**	**-40**	**-66**	**-88**	**-107**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

DUVAL COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

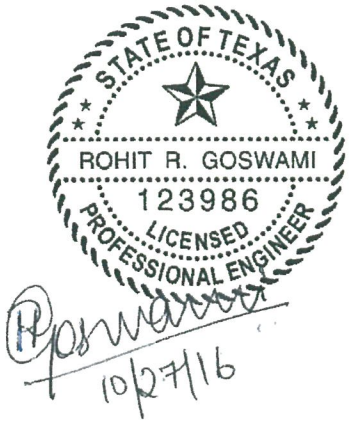
Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
BENAVIDES, NUECES-RIO GRANDE (N)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DUVAL]	4	0	0	0	0	0
		4	**0**	**0**	**0**	**0**	**0**
FREER, NUECES (N)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DUVAL]	24	73	124	168	171	175
		24	**73**	**124**	**168**	**171**	**175**
SAN DIEGO, NUECES-RIO GRANDE (N)							
GULF COAST AQUIFER SUPPLIES - SAN DIEGO	GULF COAST AQUIFER [DUVAL]	0	125	125	124	123	123
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DUVAL]	23	74	92	92	93	95
		23	**199**	**217**	**216**	**216**	**218**
Sum of Projected Water Management Strategies (acre-feet)		**51**	**272**	**341**	**384**	**387**	**393**

Appendix E

GAM Run 16-011: Duval County Groundwater Conservation District Management Plan (Author: Rohit Raj Goswami 2016)

GAM Run 16-011: Duval County Groundwater Conservation District Management Plan

Rohit R. Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
October 21, 2016



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GAM Run 16-011: Duval County Groundwater Conservation District Management Plan

Rohit R. Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
October 21, 2016

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2015), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

The TWDB provides data and information to the Duval County Groundwater Conservation District in two parts. Part 1 is the Estimated Historical Water Use/State Water Plan dataset report, which will be provided to you separately by the TWDB Groundwater Technical Assistance Section. Please direct questions about the water data report to Mr. Stephen Allen at (512) 463-7317 or stephen.allen@twdb.texas.gov. Part 2 is the required groundwater availability modeling information and this information includes:

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;
2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Duval County Groundwater Conservation District should be adopted by the district on or before July 11, 2017, and submitted to the Executive Administrator of the TWDB on or before August 10, 2017. The current management plan for the Duval County Groundwater Conservation District expires on October 9, 2017.

The Gulf Coast Aquifer System and the Yegua-Jackson Aquifer occur in the Duval County Groundwater Conservation District. Information for the Gulf Coast Aquifer System was extracted from version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004). Information for the Yegua-Jackson Aquifer was extracted from version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010).

This report discusses the methods, assumptions, and results from model runs using the groundwater availability models for the central portion of the Gulf Coast Aquifer System and the Yegua-Jackson Aquifer. This report replaces the results of GAM Run 11-001 (Hasan, 2011). GAM Run 16-011 meets current standards set after the release of GAM Run 11-001. Tables 1 and 2 summarize the groundwater availability model data required by statute. Figures 1 and 2 show the areas of the models from which the values in Tables 1 and 2 were extracted. If after review of the figures, the Duval County Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004) and the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and other, 2010) were used to extract information for this report. The water budgets for the Duval County Groundwater Conservation District were extracted for the historical model periods (1981 through 1999 for the Gulf Coast Aquifer System and 1980 through 1997 for the Yegua-Jackson Aquifer) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, and outflow from the district for the two aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Gulf Coast Aquifer System

1. We used version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the groundwater availability model.

2. The model for the central portion of the Gulf Coast Aquifer assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the deeper section of the aquifer located closer to the Gulf of Mexico. This means the areas where wells are drilled into the Evangeline Aquifer are represented using data from the shallow portions of the aquifer, such as the outcrop or just below the Chicot Aquifer closer to the Gulf of Mexico. Lower portions of the aquifer near the Gulf of Mexico are not accessible with existing wells so deeper wells will be needed to understand the aquifer properties over the entire thickness of the aquifer.

3. This groundwater availability model includes four layers, which generally represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer including parts of the Catahoula Formation (Layer 4).

4. The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Yegua-Jackson Aquifer

1. We used version 1.01 of the groundwater availability model for the central portion of the Yegua-Jackson Aquifer for this analysis. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.

2. This groundwater availability model includes five layers, which generally correspond to: outcrop of Yegua-Jackson Aquifer and younger overlying units (Layer 1), upper portion of the Jackson Group (Layer 2), lower portion of the Jackson Group (Layer 3), upper portion of the Yegua Group (Layer 4), and lower portion of the Yegua Group (Layer 5).

3. The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability models for the Gulf Coast Aquifer System and the Yegua-Jackson Aquifer within the district and averaged over the historical calibration periods, as shown in Tables 1 and 2.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.

2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.

3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.

4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district's management plan is summarized in Tables 1 and 2. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER SYSTEM FOR THE DUVAL COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST ONE ACRE-FOOT.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	18,509
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	11,537
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	3,830
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	10,341
Estimated net annual volume of flow between each aquifer in the district[1]	Not applicable	Not applicable

[1] The groundwater availability model for the central portion of the Gulf Coast Aquifer System assumes a no flow barrier at the base of the aquifer.

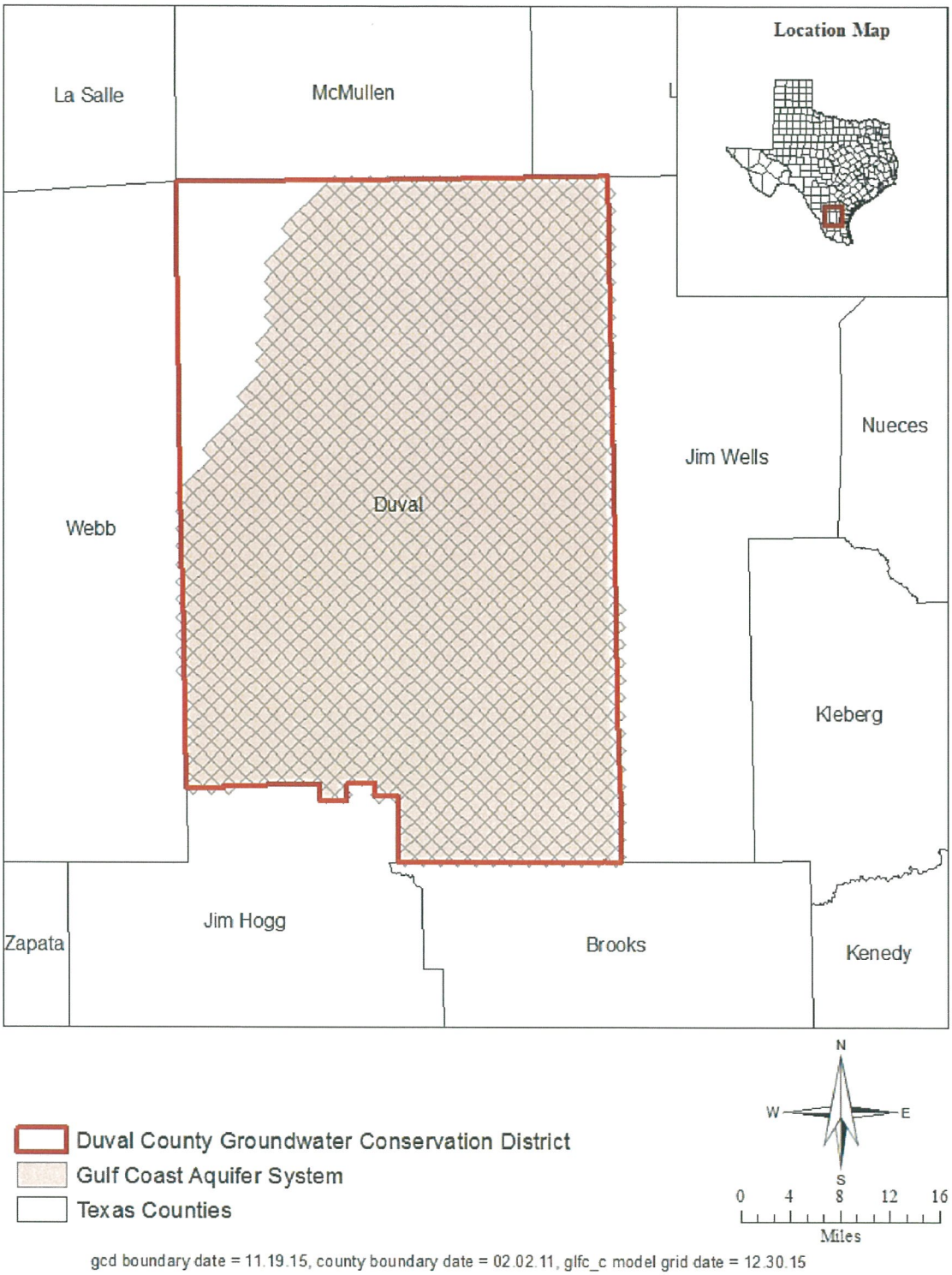

FIGURE1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE GULF COAST AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED FOR THE DUVAL COUNTY GROUNDWATER CONSERVATION DISTRICT.

TABLE 2: SUMMARIZED INFORMATION FOR THE YEGUA-JACKSON AQUIFER FOR THE DUVAL COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST ONE ACRE-FOOT.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Yegua-Jackson Aquifer	12
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	296
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	131
Estimated net annual volume of flow between each aquifer in the district	Flow from the Yegua-Jackson subcrop to the Yegua-Jackson Aquifer (outcrop)	62
	Flow from Catahoula Formation to Yegua-Jackson Aquifer	103

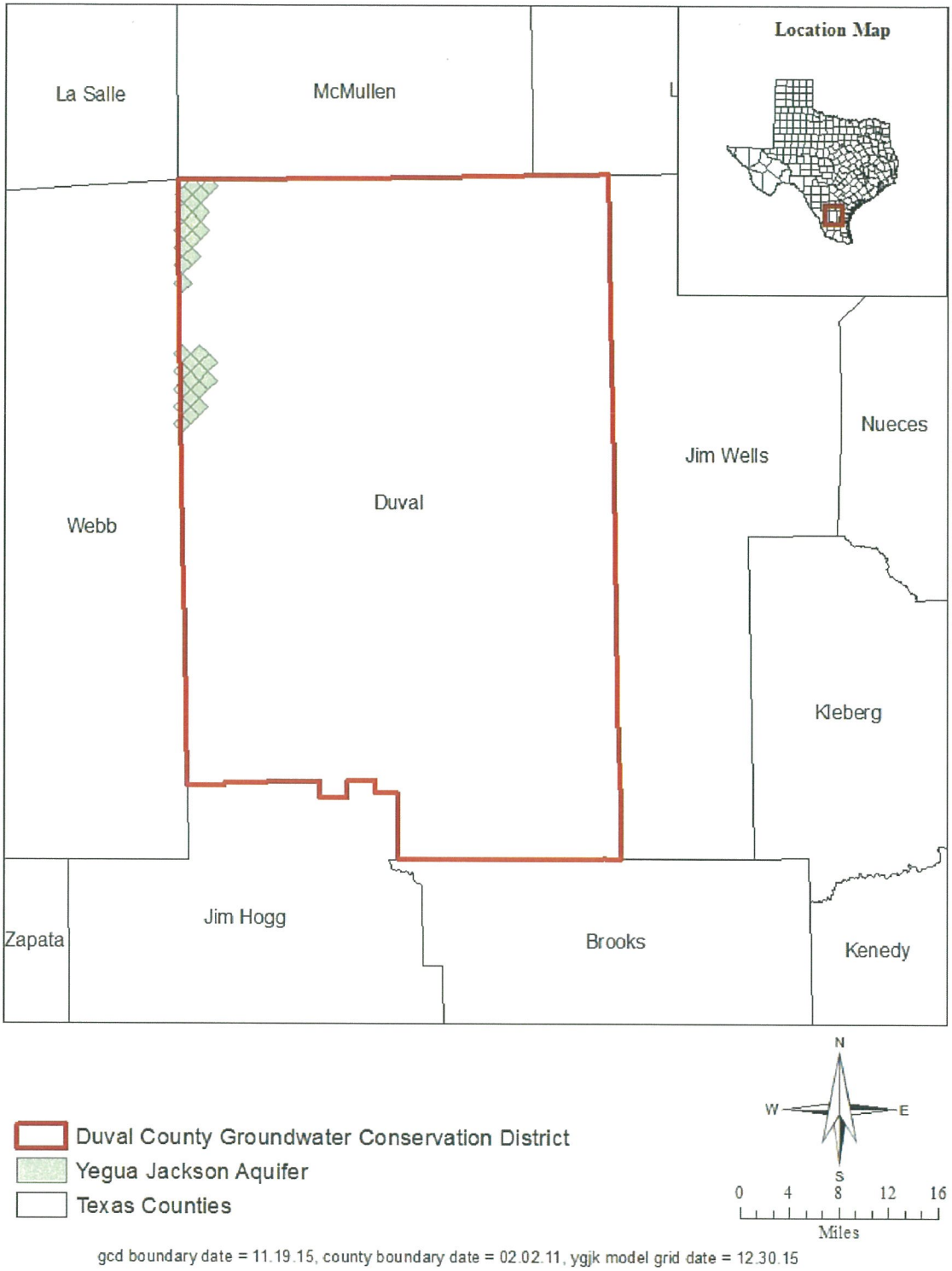

FIGURE2: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE YEGUA-JACKSON AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED FOR THE DUVAL COUNTY GROUNDWATER CONSERVATION DISTRICT.

LIMITATIONS:

The groundwater model(s) used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historic time periods.

Because the application of the groundwater models was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

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Appendix F

GAM Run 17-025: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Managament Area 16 (Author: Rohit Raj Goswami 2017)

GAM RUN 17-025 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16

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Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
May 19, 2017

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GAM Run 17-025 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 16

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Groundwater Availability Modeling Section
(512) 463-0495
May 19, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 16 (Figure 1) for the Gulf Coast Aquifer System is summarized by decade for the groundwater conservation districts and counties (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from approximately 233,000 acre-feet per year in 2020 to 312,000 acre-feet per year in 2060 (Tables 1 and 2). The estimates were extracted from results of a model run using the alternative groundwater availability model for Groundwater Management Area 16 (version 1.01). The model run files, which meet the desired future conditions of Groundwater Management Area 16, were submitted to the Texas Water Development Board (TWDB) as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 16. The explanatory report and other materials submitted to the TWDB were determined to be administratively complete on April 19, 2017.

REQUESTOR:

Mr. David O'Rourke, consultant for Groundwater Management Area 16.

DESCRIPTION OF REQUEST:

In a letter dated January 25, 2017, Mr. David O'Rourke, consultant for Groundwater Management Area 16, provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater conservation district representatives in Groundwater Management Area 16. All other aquifers in Groundwater Management Area 16 (Carrizo-Wilcox and Yegua-Jackson) were declared non-relevant for joint planning purposes. The Gulf Coast Aquifer System includes the Chicot Aquifer, Evangeline Aquifer, and the Jasper Aquifer. Clarifications to the submitted materials were received by TWDB on April 4, 2017. The desired future conditions for the Gulf Coast Aquifer System, as described

in Resolution No. 2017-01 and adopted January 17, 2017, by the groundwater conservation districts within Groundwater Management Area 16, are described below:

Groundwater Management Area 16 [all counties]

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 62 feet in December 2060 from estimated year 2010 conditions.

Bee Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 76 feet in December 2060 from estimated year 2010 conditions.

Live Oak Underground Water Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 34 feet in December 2060 from estimated year 2010 conditions.

McMullen Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 9 feet in December 2060 from estimated year 2010 conditions.

Red Sands Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

Kenedy County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

Brush Country Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 69 feet in December 2060 from estimated year 2010 conditions.

Duval County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 104 feet in December 2060 from estimated year 2010 conditions.

San Patricio County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 48 feet in December 2060 from estimated year 2010 conditions.

Starr County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 69 feet in December 2060 from estimated year 2010 conditions.

No District - Cameron County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 70 feet in December 2060 from estimated year 2010 conditions.

No District - Hidalgo County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 118 feet in December 2060 from estimated year 2010 conditions.

No District - Kleberg County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 28 feet in December 2060 from estimated year 2010 conditions.

No District - Nueces County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 21 feet in December 2060 from estimated year 2010 conditions.

No District - Webb County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 113 feet in December 2060 from estimated year 2010 conditions.

No District - Willacy County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

METHODS:

The alternative groundwater availability model for Groundwater Management Area 16 (Hutchison and others, 2011) was run using the model files submitted with the explanatory report (O'Rourke, 2017). Model-calculated water levels were extracted for the years 2010

and 2060, and drawdown was calculated as the difference between water levels at the beginning of 2010 and water levels at the end of 2060. Drawdown averages were calculated for the Gulf Coast Aquifer System by county, groundwater conservation districts, and the entire groundwater management area. As specified in the explanatory report (O'Rourke, 2017), drawdown for model cells that became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages were compared with the desired future conditions to verify that the pumping scenario specified by the district representatives achieved the desired future conditions within a one-foot variance.

The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Table 1 presents the annual pumping rates by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed for Groundwater Management Area 16. Table 2 presents the annual pumping rates by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 16.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts must consider modeled available groundwater when issuing permits in order to manage groundwater production to achieve the desired future condition(s). Districts must also consider annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the groundwater availability are described below:

- The analysis used version 1.01 of the alternate groundwater availability model for Groundwater Management Area 16. See Hutchison and others (2011) for assumptions and limitations of the model.

- The model has six layers that represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), the Jasper Aquifer (Layer 4), the Yegua-Jackson Aquifer (Layer 5), and the Queen-City, Sparta and Carrizo-Wilcox Aquifer System (Layer 6).

- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

- Groundwater Division checked the validity of the assertion that starting water levels in the model were comparable to the measured water-level conditions at the end of year 2010. Water-level values were averaged over the entire area of Groundwater Management Area 16 for the measured and modeled conditions between the years 2000 and 2010. These averaged water-level values are reported in Table 3. As presented in Table 3, the average water-levels indicate that conditions in the field did not change significantly, however, model estimated values differ significantly (by over 12 feet). Such a difference in the model estimates can be explained by the difference in values of pumping and recharge used in the model and those occurring in the field for the period between the years 2000 and 2010. It is important to note here that the groundwater availability model for Groundwater Management Area 16 was constructed using the confined aquifer assumption (and LAYCON=0 option) available within MODFLOW-96. Such an assumption leads to an almost linear response between pumping and drawdown. The Groundwater Division checked and verified the validity of the assumption by taking out the pumping input in the model from the years 2000 to 2010 and obtaining equivalent drawdown values in the year 2060. Based on the analysis, we conclude that the submitted model files are acceptable for developing estimates of modeled available groundwater. Please note that the confined aquifer assumption may also lead to physically unrealistic conditions with pumping in a model cell continuing even when water levels have dropped below the base of the model cell.

- Drawdown averages and modeled available groundwater values are based on official aquifer boundaries (Figures 1 and 2).

- Drawdown values for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging. However, pumping values from those cells were included in the calculation of modeled available groundwater.

- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.

- Average drawdown per county may include some model cells that represent portions of surface water such as bays, reservoirs, and the Gulf of Mexico.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 16 increases from approximately 233,000 acre-feet per year in 2020 to 312,000 acre-feet per year in 2060 (Tables 1 and 2). The modeled available groundwater is summarized by groundwater conservation district and county (Table 1) and by county, river basin, and regional water

planning area for use in the regional water planning process (Table 2). Small differences of values between table summaries are due to rounding errors.

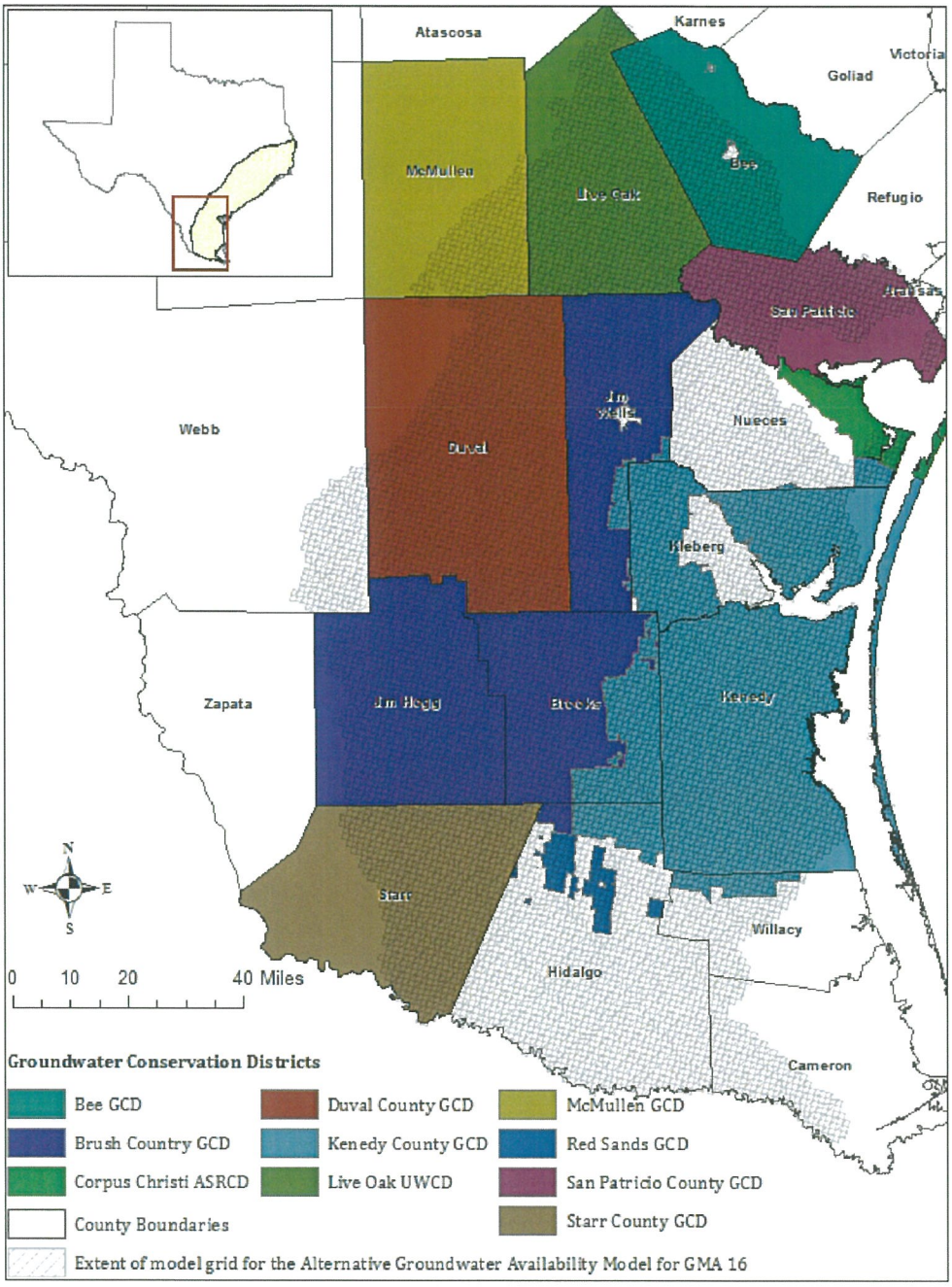

FIGURE 1. MAP SHOWING GROUNDWATER CONSERVATION DISTRICTS (GCDS), COUNTIES, AND GULF COAST AQUIFER SYSTEM EXTENT IN GROUNDWATER MANAGEMENT AREA 16 OVERLAIN ON THE EXTENT OF THE ALTERNATIVE GROUNDWATER AVAILABILITY MODEL FOR GROUNDWATER MANAGEMENT AREA 16.

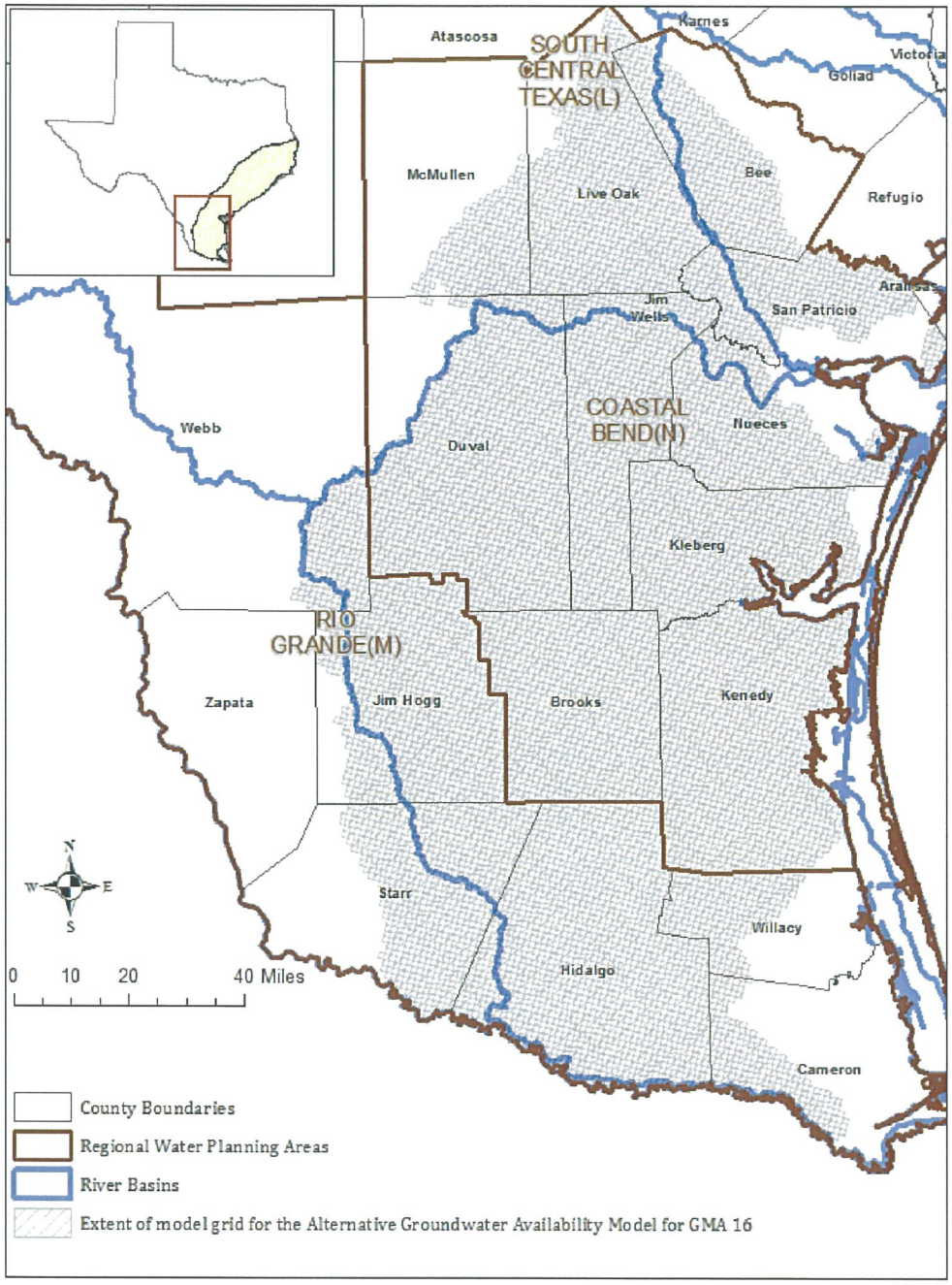

FIGURE 2. MAP SHOWING THE EXTENT OF THE GULF COAST AQUIFER SYSTEM, REGIONAL WATER PLANNING AREAS, COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 16 OVERLAIN ON THE EXTENT OF THE ALTERNATIVE GROUNDWATER AVAILABILITY MODEL FOR GROUNDWATER MANAGEMENT AREA 16.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2060. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District (GCD)	County	Aquifer	2010	2020	2030	2040	2050	2060
Bee GCD	**Bee**	**Gulf Coast Aquifer System**	**7,689**	**8,971**	**10,396**	**11,061**	**11,392**	**11,584**
Brush Country GCD	Brooks	Gulf Coast Aquifer System	3,657	3,657	3,657	3,657	3,657	3,657
Brush Country GCD	Hidalgo	Gulf Coast Aquifer System	131	131	131	131	131	131
Brush Country GCD	Jim Hogg	Gulf Coast Aquifer System	6,174	6,174	6,174	6,174	6,174	6,174
Brush Country GCD	Jim Wells	Gulf Coast Aquifer System	4,220	8,710	9,075	9,403	9,768	10,060
Brush Country GCD		**Gulf Coast Aquifer System**	**14,182**	**18,672**	**19,037**	**19,365**	**19,730**	**20,022**
Corpus Christi ASRCD	**Nueces**	**Gulf Coast Aquifer System**	**328**	**342**	**356**	**370**	**384**	**398**
Duval County GCD	**Duval**	**Gulf Coast Aquifer System**	**18,973**	**20,571**	**22,169**	**23,764**	**25,363**	**26,963**
Kenedy County GCD	Brooks	Gulf Coast Aquifer System	1,155	1,925	2,695	3,465	4,235	4,235
Kenedy County GCD	Willacy	Gulf Coast Aquifer System	289	482	674	867	1,060	1,060
Kenedy County GCD	Hidalgo	Gulf Coast Aquifer System	364	607	849	1,092	1,335	1,335
Kenedy County GCD	Jim Wells	Gulf Coast Aquifer System	261	434	608	783	957	957
Kenedy County GCD	Nueces	Gulf Coast Aquifer System	151	251	351	452	552	552
Kenedy County GCD	Kenedy	Gulf Coast Aquifer System	7,981	13,301	18,621	23,941	29,261	29,261
Kenedy County GCD	Kleberg	Gulf Coast Aquifer System	3,788	6,314	8,839	11,364	13,889	13,889
Kenedy County GCD		**Gulf Coast Aquifer System**	**13,989**	**23,314**	**32,637**	**41,964**	**51,289**	**51,289**
Live Oak UWCD	**Live Oak**	**Gulf Coast Aquifer System**	**6,556**	**8,338**	**9,343**	**8,564**	**8,441**	**8,441**
McMullen GCD	**McMullen**	**Gulf Coast Aquifer System**	**510**	**510**	**510**	**510**	**510**	**510**
Red Sands GCD	**Hidalgo**	**Gulf Coast Aquifer System**	**1,368**	**1,667**	**1,966**	**2,265**	**2,563**	**2,863**
San Patricio County GCD	**San Patricio**	**Gulf Coast Aquifer System**	**14,201**	**43,611**	**45,016**	**46,422**	**47,828**	**49,234**
Starr County GCD	**Starr**	**Gulf Coast Aquifer System**	**2,742**	**3,722**	**4,701**	**5,681**	**6,659**	**7,639**
No District-Bee	Bee	Gulf Coast Aquifer System	0	0	0	0	0	0
No District-Cameron	Cameron	Gulf Coast Aquifer System	5,378	6,688	7,999	9,311	10,620	11,932
No District-Hidalgo	Hidalgo	Gulf Coast Aquifer System	15,908	85,634	90,905	96,175	101,445	106,715

Groundwater Conservation District (GCD)	County	Aquifer	2010	2020	2030	2040	2050	2060
No District-Jim Wells	Jim Wells	Gulf Coast Aquifer System	0	0	0	0	0	0
No District-Kleberg	Kleberg	Gulf Coast Aquifer System	3,857	4,051	4,243	4,436	4,629	4,822
No District-Nueces	Nueces	Gulf Coast Aquifer System	5,753	5,996	6,240	6,487	6,731	6,974
No District-Webb	Webb	Gulf Coast Aquifer System	450	620	789	959	1,129	1,299
No District-Willacy	Willacy	Gulf Coast Aquifer System	544	664	785	905	1,024	1,145
No District-Total		**Gulf Coast Aquifer System**	**31,890**	**103,653**	**110,961**	**118,273**	**125,578**	**132,887**
GMA 16 Total		**Gulf Coast Aquifer System**	**112,428**	**233,371**	**257,092**	**278,239**	**299,737**	**311,830**

TABLE 2. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Bee	N	Nueces	Gulf Coast Aquifer System	770	893	949	978	995
Bee	N	San Antonio-Nueces	Gulf Coast Aquifer System	8,201	9,503	10,112	10,414	10,589
Brooks	N	Nueces-Rio Grande	Gulf Coast Aquifer System	5,582	6,352	7,122	7,892	7,892
Cameron	M	Nueces-Rio Grande	Gulf Coast Aquifer System	6,301	7,536	8,771	10,005	11,241
Cameron	M	Rio Grande	Gulf Coast Aquifer System	387	463	540	615	691
Duval	N	Nueces	Gulf Coast Aquifer System	326	351	376	401	428
Duval	N	Nueces-Rio Grande	Gulf Coast Aquifer System	20,245	21,818	23,388	24,962	26,535
Hidalgo	M	Nueces-Rio Grande	Gulf Coast Aquifer System	86,405	91,810	97,216	102,620	107,784
Hidalgo	M	Rio Grande	Gulf Coast Aquifer System	1,634	2,041	2,447	2,854	3,260
Jim Hogg	M	Nueces-Rio Grande	Gulf Coast Aquifer System	5,236	5,236	5,236	5,236	5,236
Jim Hogg	M	Rio Grande	Gulf Coast Aquifer System	938	938	938	938	938
Jim Wells	N	Nueces	Gulf Coast Aquifer System	593	593	593	593	593
Jim Wells	N	Nueces-Rio Grande	Gulf Coast Aquifer System	8,551	9,090	9,593	10,132	10,424
Kenedy	N	Nueces-Rio Grande	Gulf Coast Aquifer System	13,301	18,621	23,941	29,261	29,261
Kleberg	N	Nueces-Rio Grande	Gulf Coast Aquifer System	10,365	13,082	15,800	18,518	18,711
Live Oak	N	Nueces	Gulf Coast Aquifer System	8,297	9,297	8,522	8,400	8,400
Live Oak	N	San Antonio-Nueces	Gulf Coast Aquifer System	41	46	42	41	41
McMullen	N	Nueces	Gulf Coast Aquifer System	510	510	510	510	510
Nueces	N	Nueces-Rio Grande	Gulf Coast Aquifer System	5,862	6,191	6,522	6,851	7,079
Nueces	N	Nueces	Gulf Coast Aquifer System	727	756	787	816	845
Nueces	N	San Antonio-Nueces	Gulf Coast Aquifer System	0	0	0	0	0
San Patricio	N	Nueces	Gulf Coast Aquifer System	4,130	4,502	4,874	5,247	5,619
San Patricio	N	San Antonio-Nueces	Gulf Coast Aquifer System	39,481	40,514	41,548	42,581	43,615
Starr	M	Nueces-Rio Grande	Gulf Coast Aquifer System	1,497	1,891	2,285	2,678	3,072

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Starr	M	Rio Grande	Gulf Coast Aquifer System	2,225	2,810	3,396	3,981	4,567
Webb	M	Rio Grande	Gulf Coast Aquifer System	98	125	152	179	206
Webb	M	Nueces	Gulf Coast Aquifer System	18	22	27	32	37
Webb	M	Nueces-Rio Grande	Gulf Coast Aquifer System	504	642	780	918	1,056
Willacy	M	Nueces-Rio Grande	Gulf Coast Aquifer System	1,146	1,459	1,772	2,084	2,205
GMA 16-Total			**Gulf Coast Aquifer System**	**233,371**	**257,092**	**278,239**	**299,737**	**311,830**

TABLE 3. COMPARISON OF MEASURED AND MODELED WATER-LEVELS AVERAGED OVER GROUNDWATER MANAGEMENT AREA 16 FROM THE DECADAL YEARS 2000 AND 2010. VALUES OF FIELD MEASURED WATER-LEVELS WERE OBTAINED FROM THE TWDB GROUNDWATER DATABASE (GWDB).

Average water levels in Groundwater Management Area 16 (in feet above mean sea level)		
	Year 2000	Year 2010
Field measurements (GWDB)	114.1	114.4
Model estimated	119.5	107.1

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and groundwater levels in the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

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Appendix G
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Office: 361-256-3589
Fax: 361-256-3592

November 17, 2017

Rocky Freund
Deputy Executive Director
602 N. Staples St., Suite 280
Corpus Christi, Tx. 78401

Re: Management Plan, agenda, minutes, publisher's affidavit

Dear Mrs. Freund,

Good morning, it was nice having lunch with you all before the Region N. meeting, I am glad that Mr. Andy Garza invited me. On a different note, enclosed please find a hard copy of my management plan, a copy of the agenda, minutes, and publisher's affidavit. I had sent you an electronic copy via email on October 10, 2017 and wanted to follow up with a hard copy. If I am lacking anything, please feel free to call or email me, I may be reached by email duvalgwd.mngr@gmail.com or by my office telephone or cell at (361)256-3589, or (361)701-8882.

Respectfully,

Luis "Louie" Pena
General Manager
Duval County Groundwater District

Resolution

Adopting Duval County Groundwater Conservation District 2017 Management Plan

September 27, 2017

WHEREAS, on September 27, 2017, the Duval County Groundwater Conservation District Board of Directors directed that Notice of Public Hearing to be held on September 27 , 2017, at 6:00 PM at the Duval County Groundwater Conservation District in Benavides, TX regarding the adoption of the proposed 2017 District Management Plan to be posted in a place readily accessible to the public at the District office; by publishing in one or more newspapers of general circulation in the Duval County; by providing notice to people who requested notice; and by making a copy of the proposal accessible to the public during normal hours of the district.

WHEREAS, on September 27, 2017, the Duval County Groundwater Conservation District Board of Directors, with a quorum being present, held the September 27, 2017 public hearing regarding the adoption of the proposed 2017 Duval County Groundwater District Management Plan; and

WHEREAS, the Duval County Groundwater Conservation District Board of Directors, after a public hearing was held, convened to consider the adoption of the proposed 2017 Duval County Groundwater District Management Plan; and

The Duval County Groundwater Conservation District Board of Directors after a motion being made and seconded, it was unanimously passed and it was

RESOLVED that the 2017 Duval County Groundwater District Management Plan be ADOPTED as presented as is more particularly described in the Duval County Groundwater District 2017 Management Plan attached hereto and made part hereof for all purposes.

DATED this 27th day of September, 2017.

Acting Vice
(Atlee M. Parr) President

Attested by _____
Secretary

DUVAL COUNTY GROUNDWATER CONSERVATION DISTRICT

Duval County Groundwater Conservation District

Certificate of Resolution

I Luis Pena, General Manager of the Duval County Groundwater Conservation District, hereby certify that the attached Resolution adopting the Duval County Groundwater Conservation District Management Plan, is a true and correct copy of the Resolution adopting the Duval County Groundwater Conservation District Management Plan; that on September 27, 2017 the Duval County Groundwater Conservation District Board of Directors, by a Majority vote, passed and approved the said resolution.

Signed on 9/27/2017

(Luis Pena) General Manager

NOTICE OF PUBLIC HEARING

Duval County Groundwater Conservation District's

Amended Management Plan

The Duval County Groundwater Conservation District will hold a Public Hearing regarding the adoption of the proposed Duval County Groundwater Conservation District's Amended Management Plan.

The Public Hearing will be held on September 27, 2017 at 6:00 p.m. at the Duval County Groundwater Conservation District located at 225 East Railroad Avenue in Benavides, TX.

A proposed District Amended Management Plan may be obtained at the District Office located at 225 East Railroad Avenue, Benavides, Texas 78341.

Luis Pena

General Manager

AFFIDAVIT OF PUBLISHER

STATE OF TEXAS §

COUNTY OF JIM WELLS §

BEFORE ME, the undersigned Notary Public, on this day personally Appeared Gerard Delaney, who, being by me duly sworn, stated:

1. Affiant is an employee of Alice Echo-News Journal and has personal knowledge of the facts stated in this affidavit.

2. Gerard Delaney (Senior Group Publisher) publishes a newspaper of general Circulation in Jim Wells, Duval, Nueces, County, Texas, which is known as ALICE NEWSPAPERS - ALICE ECHO-NEWS JOURNAL & NUECES COUNTY RECORD STAR.

3. Notice was published in said newspaper on the following date(s):

9/27/17

Ofelia Hunter
Publisher or Representative

SUBSCRIBED AND SWORN TO BEFORE ME by the above-named affiant on 9/27, 2017 to certify which witness my hand and seal of office.

NOTARY PUBLIC STATE OF TEXAS
SANDRA SALAIZ
Notary ID # 124998164
My Commission Expires
July 23, 2020

Sandra Salaiz
Notary Public in and for
The State of Texas

SEPTEMBER IS A MONTH FULL OF RAISING AWARENESS FOR DIFFERENT CAUSES.
We thank all the individuals that work hard in our communities to bring the residents together for free events while providing educational information.

GOOD LUCK TO ALL AREA ATHLETES!
We're wishing you a safe and victorious season!

CROSS COUNTRY

For statistics, safety information and resources, like us at Facebook.com/79thDAO, follow us on Twitter @79thDAO, on Instagram @79thDAO and visit www.79-districtattorney-tx.org.

COMPLIMENTS OF CARLOS OMAR GARCIA FOR JUDICIAL DISTRICT ATTORNEY

JIM WELLS COUNTY
P.O. Box 3157 • Alice, Texas 78333
(361) 668-5718 • Fax (361) 668-9974

BROOKS COUNTY
P.O. Box 283 • Falfurrias, Texas 78355
(361) 325-5604, Ext. 259 • Fax (361) 325-2933

SUBMITTED

4-H Shooting Certification Training

submitted
mtrevino@aliceechonews.com

Annie Tijeran, volunteer leader for Jim Wells County 4H, and Barbie Wymore, JWC Extension Agent attended the District 12 4-H Shooting Certification training in Carrizo Spring.

The ever growing 4-H project in JWC with 4-H youth. 4-H'ers have to attend their regular 4-H Club meeting. More information on 4-H call 361-668-5705. The team now has five certified archery coaches with an increasing number of youth trying the new project.

SUBMITTED

4-H Grocery Store Wars

submitted
mtrevino@aliceechonews.com

A new twist to the 4-H Food and Nutrition program sent the children to the local grocery store for 4-H Grocery Store Wars.

According to the program officials, the children had a blast and the kids, with adults present, had so much fun as they collected seven surprise items in under 10 minutes for under $15.

The groceries purchased were taken back to the fairgrounds to make a a meal.

Follow The Alice Echo-News Journal on Facebook at www.facebook.com/aliceechonews

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3 Lbs Chuck Steak
2 Lbs Round Steak
3 Lbs Hamburger Meat
3 Lbs Leg Quarters
1 Lb Chorizo Mexicano
$52.98 16lbs

2 lbs Beef Fajita
3 lbs Leg Quarters
1 lb Smoked Sausage
$23.98 6 lbs

5 Lbs 7-Bone Steak
5 Lbs Chuck Steak
4 Lbs Round Steak
3 Lbs Lean Ground Beef
7 Lbs Leg Fryers
1 Lb Chorizo
1 Lb Beef Fajita
$99.98 25lbs

5 Lbs Hamburger Meat
5 Lbs Leg Quarters
3 Lbs Chuck Steak
1 Lb Stew Meat
1 Lb Chorizo Mexicano
$39.89 12lbs

3 Lbs Round Steak
3 Lbs Chuck Steak
3 Lbs 7-Bone Steak
2 Lbs Stew Meat
2 Lbs Lean Ground Beef
2 Lbs Leg Quarters
1 Lb Chorizo Mexicano
$65.98 16lbs

FRESH CABRITO & MACHITOS

8 Lbs 7-Bone Steak
6 Lbs Beef Chuck
5 Lbs Round Steak
2 Lbs Skinless Fajitas
6 Lbs Lean Grnd Beef
3 Lbs Chuck Roast
2 Lbs Chorizo Mexicano
1 Lb Bacon
3 Lbs Pork Chops
3 Lbs Hamburger Meat
2.5 Lbs Burger Patties
7.5 Leg Quarters
$199.98 50lbs

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NOTICE OF PUBLIC HEARING

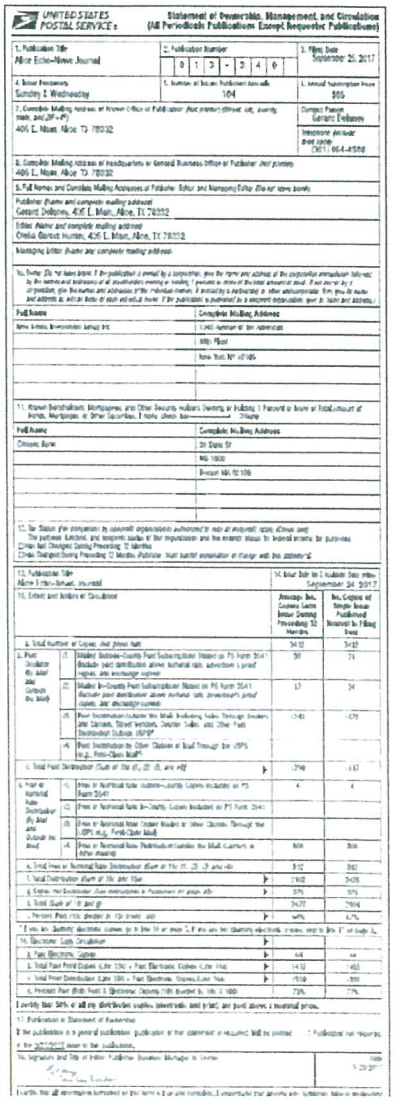
Duval County Groundwater Conservation District's Amended Management Plan

The Duval County Groundwater Conservation District will hold a Public Hearing regarding the adoption of the proposed Duval County Groundwater Conservation District's Amended Management Plan.

The Public Hearing will be held on September 27, 2017 at 6:00 p.m. at the Duval County Groundwater Conservation District located at 225 East Railroad Avenue in Benavides, TX.

A proposed District Amended Management Plan may be obtained at the District Office located at 225 East Railroad Avenue, Benavides, Texas 78341.

Luis Pena
General Manager



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18. Signature and Title of Editor, Publisher, Business Manager, or Owner — 9/29/2017

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading

FILED FOR RECORD
AT 9:00 O'CLOCK A.M.
SEP 13 2017
ELODIA M. GARZA
CLERK COUNTY COURT DUVAL COUNTY, TEXAS
BY [illegible] DEPUTY

NOTICE OF PUBLIC MEETING
OF THE BOARD OF DIRECTORS OF THE
DUVAL COUNTY GROUNDWATER CONSERVATON DISTRICT

Notice is hereby given that a Special meeting, and a public hearing, of the governing body of the above-named political subdivision will be held on Wednesday the 27th, day of September 2017, beginning at 6:00 P.M., in the conference room of the Duval County Groundwater Conservation District office located at 225 Railroad Avenue, Benavides, Texas, in accordance with the duly posted notice of said meeting. For additional information call (361) 256-3589.

1. Call the meeting to order, declare meeting open to the public and roll call.

2. Reading and approval of the minutes of the August 16th, 2017 general meeting, and approval of the September 7th, 2017 special meeting.

3. Review, discuss, and act on 2017 August financial statement from Mr. Ernest Garza (CPA).

4. Review, discuss, and pay all bills due.

5. Review, discuss, and act on draft management plan.

6. Review, discuss, and adopt certificate of resolution for the Duval County Groundwater Conservation District's Management Plan.

7. District General Managers monthly report.
   A. Credit card expenses September 2017
   B. Wells registered
   C. Correspondence
   D. Meetings attended

8. Discussion and possible action on initiating rulemaking to amend District rules as needed.

9. Discussion and possible action on Mary Sahs conducting training at the District office covering issuing registration certificates and permits for all registered and permitted wells using forms generated during the recent District Rule amendments; well database entry; and file completion and management on registered and permitted wells.

10. Public forum, questions, comments from any guests in attendance.

11. Setting next meeting of the Board of Directors.

12. Adjournment.

Executive Session. The Duval County Groundwater Conservation reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of matter, as authorized by Texas Government Code Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations Regarding Gifts and Donations), 551.074 (Personnel Matters), 551.076(Deliberations about Security Devices) and 551.087 (Economic Development Negotiations)."

FILED FOR RECORD
AT 9:00 O'CLOCK A. M

SEP 13 2017

ELODIA M. GARZA
CLERK COUNTY COURT, DUVAL COUNTY, TEXAS
BY _____ DEPUTY

DATED THIS THE 13th, DAY OF September, 2017.

Luis Pena, General Manager
Duval County Groundwater Conservation District

The above agenda schedule represents an estimate of the order for the indicated items and is subject to change at any time. These public meetings are available to all persons regardless of disability. If you require special assistance to attend the meeting, please call (361) 256-3589 at least 24 hours in advance of the meeting to coordinate any special physical access arrangements.

At any time during the meeting and in compliance with the Texas Open Meetings Act, Chapter 551, Government Code, Vernon's Texas Codes, Annotated, the DUVAL COUNTY Groundwater Conservation District Board may meet in executive session on any of the above agenda items or other lawful items for consultation concerning attorney-client matters (§ 551.071); deliberation regarding real property (§ 551.072); deliberation regarding prospective gift (§ 551.073); personnel matters (§ 551.074); and deliberation regarding security devices (§ 551.076). Any subject discussed in executive session may be subject to action during an open meeting.

I, the undersigned authority, hereby certify that the above Notice of Meeting of the governing body of the political subdivision is a correct copy of the Notice filed and that I posted the Notice on the bulletin board for public notices in the Duval County Courthouse located in San Diego, Duval County, Texas on this the 13th, day of September 2017, at 9:00 a.m. / p.m.

Elodia M. Garza
Duval County Clerk

BY: _____

MINUTES OF MEETING

BOARD OF DIRECTORS

THE STATE OF TEXAS	§
	§
DUVAL COUNTY GROUNDWATER	§
CONSERVATION DISTRICT	§

The Board of Directors of Duval County Groundwater Conservation District (the "District") met in General Meeting, (Public Hearing) open to the public, on Wednesday, 27th, day September, 2017, beginning at 6:00 P.M., in the conference room located at 225 East Railroad Avenue, City of Benavides, Texas in accordance with the duly posted notice of said meeting.

1. The General Meeting was called to order and was declared open by our secretary Mr. J.M. Rodriguez at 6:05 P.M. Pledge of allegiance was cited.

Members present by roll call were:	
Atlee Parr arrived at 6:45	District General Manager: Luis Pena
Elda Flores	District's Attorney: Jaime Garza
Leonel Garza	Roberto Garcia
J.M. Rodriguez	Administrative Assistant: Carolina Casas

Guests: Mr. Bo McAnear, Mr. George Dubose, Mr. Rudy Torres San Diego MUD, Dennis Guajardo intern

2. On agenda item #2, reading and approval of the August 16th, general meeting and approval of the September 7th, special meeting, Mr. J.M. Rodriguez asked for a motion to accept both meetings as presented, Mrs. Elda Flores made the motion, followed by a second by Mr. Leonel Garza, motion passes.

3. On agenda item #3, August financial statement presented by our CPA Mr. Ernest Garza, we are financially strong, pledges over one million, waiting on some more tax revenues. A question was asked by Mrs. Elda Flores, "What happens when a landowner goes delinquent on their taxes?" Mr. Garza then explained, " the taxing entity can foreclose on the landowner", Mr. Jaime Garza added "the taxing entities can also have a tax foreclosure sale, there is also adverse possession in some instances". Mr. J.M. Rodriguez then asked for a motion to accept the financials as presented by our CPA Ernest Garza, Mrs. Elda Flores made the motion followed by a second by Mr. Leonel Garza, motion passes.

4. On agenda item #4, review, discuss, and pay all bills due, our CPA Mr. Ernest Garza presented the disbursement sheet one comment was made by general manager Luis Pena, on the appraisal district's invoice, they bill us quarterly, we are making a lump sum and will have a receipt to reflect this. Mr. J.M. Rodriguez asked for a motion to pay all bills due, motion by Mrs. Flores, followed by a second by Mr. Leonel Garza, motion passes.

5. On agenda item #5 to review, discuss, and act on draft management plan, Mrs. Elda Flores asked to open the public hearing and asked for public comment, no one responded, she then made the motion to close the public hearing, followed by a second by Mr. Leonel Garza, motion passes. Mrs. Flores then made the motion to adopt the management plan, Mr. Leonel Garza followed with a second, motion passes.

6. On agenda item #6, to review, discuss, and adopt certificate of resolution for the Duval County Groundwater Conservation District's Management Plan, Mrs. Flores made the motion to adopt the plan, followed by a second by Mr. Leonel Garza, motion passes.

7. On agenda item #7, general manager Luis Pena gave his monthly credit card report, spoke about the meetings that were attended, spoke about the trip to the Hispanic Farmer and Ranchers seminar in McAllen, Texas, briefly spoke about trip to organic farmer on 10 acres producing organic fruit and vegetables without any herbicides or pesticides. Also gave brief discussion on how one farmer/rancher converted his dryland corn and milo to hay grazer for ensilage for steers and how incorporating a Waigu bulls (Japanese breed) and artificial insemination was allowing this rancher to get a premium price for his steers.

8. On agenda item #8, discussion and possible action on initiating rulemaking to amend District rules as needed, the board decided to table the item until next meeting, Mrs. Elda Flores made the motion, followed by a second by Mr. Leonel Garza. Mr. Atlee Parr walked in at 6:45 motion passes unanimously.

9. On agenda item #9, discussion and possible action on Mary Sahs conducting training at our district office, motion was made by Mrs. Elda Flores, followed by a second by Mr. Leonel Garza, motion passes unanimous.

10. On agenda item #10, public forum no comments were made.

11. On agenda item #11, the board decided to set October 25,2017 for our next meeting.

12. On agenda item #12, motion to adjourn at 7:28 by Mrs. Elda Flores, followed by a second by Mr. Leonel Garza, motion passes unanimous.